

TRANSATLANTIC COOPERATION ON CRITICAL SUPPLY CHAIN SECURITY

HEARING

BEFORE THE

SUBCOMMITTEE ON EUROPE, ENERGY, THE
ENVIRONMENT AND CYBER

OF THE

COMMITTEE ON FOREIGN AFFAIRS
HOUSE OF REPRESENTATIVES

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TRANSATLANTIC COOPERATION ON CRITICAL SUPPLY CHAIN SECURITY

Wednesday, January 19, 2022

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON EUROPE, ENERGY, THE ENVIRONMENT,
AND CYBER,
COMMITTEE ON FOREIGN AFFAIRS,
Washington, DC

The subcommittee met, pursuant to notice, at 2:08 p.m., via Webex, Hon. William R. Keating (chairman of the subcommittee) presiding.

Mr. KEATING. House Foreign Affairs Subcommittee will come to order.

Without objection, the chair is authorized to declare a recess of the committee at any point. And all members will have 5 days to submit statements, extraneous material, and questions for the record subject to the length and limitation of the rules. To insert something into the record, please have your staff email a previously mentioned address or contact full committee staff.

Please keep your video function on at all times even when you are not recognized by the chair. Members are responsible for muting and unmuting themselves. Please remember to mute yourselves after you finish speaking. Consistent with House Resolution 965 and the accompanying regulation, staff will only mute members and witnesses as appropriate when they are not under recognition to eliminate background noise.

See that we have a quorum present. I will now recognize myself for an opening statement. Pursuant to notice, we shall hold the hearing today entitled, "Transatlantic Cooperation in Critical Supply Chain Security."

I want to welcome everyone to what is an important and timely hearing to address transatlantic cooperation on modernizing critical supply chain security. Whether it is the manufacturer of communication technologies in Asia or simply shipping cranberries from a bog in southeastern Massachusetts, supply chains are essential to the everyday lives of Americans and Europeans.

The U.S. and the European Union together account for 42 percent of global GDP and both rely heavily on global value chains for their trade. Thus it is vital that we work with our transatlantic allies to modernize and secure global supply chains, which today support two-thirds of the entire world's trade.

Over the last 30 years, supply chains have diversified and now reached the entire globe. A high end semi-conductor, for example, could be designed by a tech firm in Silicon Valley, sourced from materials from around the world, and manufactured in a facility in Taiwan using equipment built in the Netherlands.

Further, this same semi-conductor could be a component of a critical national security technology or a consumer good, such as an electric vehicle or a cell phone. In short, supply chain encompasses everything from the design of a product to the sourcing of its materials, to its marketing, as well as its distribution to customers.

As a result, supply chains are not only complex, but they are also highly specialized, requiring unique solutions for every supply chain challenge.

Today, the unprecedented events of the past 2 years have put a strain on our global supply chains and forced the world to find innovative and creative solutions to alleviate shortages. The global COVID 19 pandemic has drastically changed our day-to-day lives, affecting global supply chains as a result. Increased prices and commodities have made the health of our supply chains a front-page news story for many Americans.

However, to meet the challenge, I believe we must consider more than just the obstacles that lay directly in front of us and consider rather long-term solutions to shore up persistent bottlenecks, inefficiencies, and complications that our current supply chains face.

With this approach, I believe, we will not only be able to address current challenges, but mitigate and even prevent these future issues from occurring.

One aspect of this long-term approach must be confronting China's role in our globalized world. China's investment in the semi-conductor industry and control over rare earth imports is a growing national security concern for the United States.

This growing concern can only be effectively dealt with in a multilateral fashion with our European allies and partners. Confronting China unilaterally could cause considerable harm to our own economy. We should deepen our cooperation with Europe to diversify our supply chains.

We must also stand united when China chooses to use economic coercion against our allies, like Lithuania who chosen to opt out of China's current economic forums with Europe.

For decades it has been undeniable that our Democratic partners in Europe have brought immense benefits to U.S. consumers, businesses, and organization. Products are cheaper, more accessible, and the same is true for countries in Europe. I firmly believe our transatlantic partners remain a critical tool to modernizing and protecting supply chains and that a strong transatlantic partnership ensures a strong transatlantic economy.

To this end, I am pleased to see the Biden Administration's work with our transatlantic partners through the U.S., EU, Trade and Technology Council. At the inaugural TTC meeting in Pittsburgh last year, ten working groups were established to engage with our transatlantic partners in everything from establishing standards for new technologies, cooperating on data governance, and also ensuring accessibility of digital tools for small and medium-sized enterprises.

The third working group of the TTC will specifically address supply chains through an initial focus on clean energy, pharmaceuticals, the availability of semi-conductors, and critical materials.

All of which sectors are immense in their importance given to the ongoing climate and healthcare crisis. To build on the TTC's objec-

tive, we, in Congress, must not lose sight of the importance of addressing our supply chain security, whether it is another pandemic, increased weather events due to climate change, or vulnerabilities in our cybersecurity, our supply chains will continue to be tested.

Destructions in our supply chains affect all Americans and we need to work now to prepare harden and to secure supply chains to alleviate and lessen the impact a future, potentially economically disruptive global events.

As I have Stated before, as chair of the subcommittee, I stand in full support of transatlantic solutions to our global problems. This includes the U.S.-EU Trade and Technology Council and I look forward to following up with other outcomes as we move forward with the second session, which will take place later this year.

To discuss transatlantic solutions to our current problems and how we, in Congress, can work our transatlantic allies on these issues, we have invited three outstanding witnesses to provide testimony. Dr. Willy Shih from the Harvard Business School, Dr. Chad Bown from Peterson Institute for International Economics, and Dr. Derek Scissors from the Economic Enterprise Institute. Each will provide testimony on our supply chain security, and I look forward to a very productive discussion to see how effectively and impactfully we can move forward with transatlantic solutions to the current problems with the global supply chains.

Now, I will recognize our ranking member, Representative Fitzpatrick, for his opening remark.

Mr. FITZPATRICK. Good afternoon. Thank you, Chairman Keating. Thank you to our witnesses for being with us today. And it is my hope today that we can examine ways to strengthen our transatlantic partnerships and to fend off threats to our global economy.

In an increasingly interconnected world, global value chains have become the norm and these multi-tiered supply chains benefit the United States and its partners greatly, but also present unique challenges. As the world was overcome by the COVID-19 pandemic, supply chains were pushed beyond their limit. As a result, the best and the worst aspects of these relationships were all exposed.

There were many victories for sure, accelerated vaccine development and manufacturings at levels not seen before were made possible through public and private cooperation with our transatlantic allies. Only through advanced agreements, information sharing, and cooperation was this possible.

There were also many flaws revealed. Domestic policies differed from nation to nation often based on the severity of the pandemic which brought lockdowns and dramatically reduced work forces. And these effects compounded at each point of exchange and bottlenecks were magnified.

These flaws are not lost on the strategic competitors of the United States and its transatlantic allies, especially those nations that are deeply intertwined with us economically. Recognizing that the shortcomings could be exploited, our perspectives of supply chains must be increasingly viewed through the lens of national security, not just economics, but we have seen first hand that China is willing to undermine western values through forced labor in

Xinjiang and predatory lending practices in the Balkans and beyond.

Less than a decade ago, the Chinese Communist Party demonstrated its monopoly on rare earth minerals to cause dramatic price fluctuations that harmed American consumers. Recently, the CCP was quick to leverage its competitive advantage as a retaliatory mechanism against Lithuania. No industry better represents the complex nature of global supply chains in their nexus with national security like that of semi-conductors.

Chips are truly the building blocks of modern society, yet they take months to produce and travel around the world before being installed in their end products.

While our demand grows for their use in technology from smartphones to our satellites, U.S. production of semi-conductors has plummeted from 40 percent of the world's supply in 1990 to just 12 percent of the global supply today.

Concurrently, China is investing in the industry at unprecedented levels, utilizing methods which appear to challenge current global rules. I have proudly worked with my colleagues to identify solutions to this issue and members of this committee, introduced through the CHIPS For America Act, which will go on to be included in the NDAA.

The funding authorized by this bill would help build and modernize semi-conductor manufacturing facilities across America to alleviate the current chip shortage that is impacting a range of industries and millions of our American workers.

These types of programs will continue to bolster American manufacturing of chips and bring the knowledge and skills of our closest allies under our own source. Just last year, U.S.-based intel, North American-based global foundries, South Korean-based Samsung, and Taiwan's world leading TSMC have announced that they will build domestic fabrication facilities right here in our United States.

The reality is that the United States and a small group of democratic countries right now control the vast majority of semi-conductor intellectual property and technology. If all of these countries work together, we can ensure that the means of production for semi-conductors stays in democratic countries and are not controlled or migrated to the Chinese Communist Party.

Finally, to promote cooperation and competitiveness, United States and the EU have joined into a new trade and technology council, which, in part, works to develop more secure supply chains. And I am hopeful that if the TTC is used effectively, it can provide a needed venue through which to address the points of friction in the transatlantic relationship that have impeded building a united coalition against the Chinese Communist Party.

Nothing is more important. However, unless Europe is willing to cease targeting U.S. technology companies and to be more clear-eyed about the threat posed by the Chinese Communist Party's unfair and illegal economic practices, this council could end up being nothing more than a talking shot that achieves little.

None of us want to see that. It is my hope that our witnesses can address what more can be done to transform the strong rhetoric on the threat posed by the Chinese Communist Party into nec-

essary and united action. The time is now to build a unified coalition and to resolve key vulnerabilities in our global supply chains.

Thank you to our witnesses for being here.

And Mr. Chairman, I yield back.

Mr. KEATING. Thank you, Representative.

I will now recognize each witness for 5 minutes.

Without objection, all of your prepared written statements will be made part of the record.

Our first witness is Dr. Willy Shih. He is a professor of management practice in business Administration at the Harvard Business School. Prior to the Harvard Business School, Dr. Shih spent 28 years in industry at companies such as IBM and Eastman Kodak where he worked in product development and manufacturing in a wide variety of sectors.

Thank you very much for joining us, Dr. Shih. You will now be recognized for 5 minutes.

**STATEMENT OF DR. WILLY C. SHIH, ROBERT & JANE CIZIK
PROFESSOR OF MANAGEMENT PRACTICE IN BUSINESS ADMINISTRATION,
HARVARD BUSINESS SCHOOL**

Dr. SHIH. Thank you.

Chairman Keating, I will be using a visual aid during my oral testimony today. I ask that it be submitted into the record alongside my written testimony.

Mr. KEATING. Without objection, yes.

Dr. SHIH. OK. Thank you very much.

Chairman Keating, Ranking Member Fitzpatrick, members of the committee, distinguished guests, thank you for the opportunity to speak with you today.

As the Chairman Keating said, I am on the faculty of Harvard Business School where I have taught for the past 15 years. Prior to that, I spent 28 years in industry and doing manufacturing and product development during a time when we really saw global supply chains take root. So when I teach about this at the school, I come from the perspective of not only having studied the theory, but lived the practice.

What I hope to convey today is some of the basic logic around why supply chains are structured the way they are, how the U.S. is deeply interconnected to so many levels to Europe, and why I believe a more nuanced understanding of that can help us build a more robust partnership.

Now, the key concept is tiering. OK? And by this I mean, when you have a product assembler who will rely on a network of suppliers who will in turn rely on a network of suppliers and so on down the chain. This tiering can be quite extensive, it can be quite deep. In the auto industry it is as much as nine tiers deep.

This is one of the reasons, for example, when you have a disruption somewhere in the chain, somebody cannot assemble their products anymore. And we have seen a lot of this over the last 2 years. Now, why do we have this tiering? The key concept here is specialization and technological complexity.

Let's say you are making a notebook computer, it takes very different skills to make the microprocessor compared to the disc storage or the solid-State storage or the keyboards or mechanicals, or

even the battery or charger, or the flat panel display. If you visit some of the factories where they make the chips or the flat panels or all these things, you see immediately how different this is.

Now, both Chair Keating and Ranking Member Fitzpatrick have mentioned the semi-conductor supply chain. If you look at the semi-conductor supply chain, we have already heard about the Dutch company ASML who makes these extreme UV scanners that cost over \$150 million each. They use an optical engine that comes from Zeiss in Oberkochen, Germany. Okay. They also use an extreme UV light source that comes from Cymer in San Diego.

And then what they do is, they will assemble these machines, ship them to the TSMCs of the world, OK, who will use—who will manufacture chips produced by the Apples or the Qualcomms of the world who will use design software that came from Synopsis or Cadence or what have you. They will produce the completed wafer. Then they will ship it to Southeast Asia where you have outsourced assembly and test companies who will assemble them into packages, and then ship the chips into China for final assembly.

So what you see is a very complex, highly interdependent global coordination. Now, the other reason you have supply chains structured the way you do is the ability to achieve scale benefits. You see this particularly—in I did a study on active pharmaceutical ingredients to try to map that supply chain last year.

This is a corner of that map applying to pharmaceuticals that is normally very opaque. I am not going to bore you with the details this is in my written testimony. But what you see at the core is many European manufacturers occupy key supply chain positions.

One last example, this was a metal tool that the CEO of a manufacturer Long-Stanton gave me a couple years ago. They are in West Chester Township, Ohio, and they manufacture the brake brackets for the carbon disc brakes in Boeing 787 and many other commercial airlines. They buy their steel from Voetsalpine and then they manufacture the brackets. Then they ship the brackets to Safran Landing Systems who assembles them in France and in the U.S., and they in turn will ship it to—they will ship its to North Charleston, South Carolina, where Boeing will put it into a jet liner.

OK. Now, what you see is a lot of this inter dependence. Here the message is about our trade policies. When we imposed tariffs on steel a couple of years ago, turns out Voetsalpine is the only supplier that's qualified by Airbus and Boeing to make this high temperature, very unique alloy, right?

We caused this existential crisis for Long-Stanton, so that Safran said, I got to get rid of my U.S. suppliers. So we have to think about our trade policies when we do things like that. OK.

Now, having said all that, I would tell you that I see Europe and U.S. as highly interconnected and interdependent. While we are still a technology leader, global R&D spending and technology are much more distributed than they were 50 or 30 years ago when it disproportionately favored the U.S.

So if we were to view the U.S. and the EU and maybe a few East Asian partners together, we would have a very comprehensive coverage of all the advanced technologies I can think of.

Partnership with Europe makes a lot of sense to me, one in which we work together to ensure more resilience and mutual benefit. I think cooperation with Europe is critical to American competitiveness, both now and into the future.

Thank you very much. I will be happy to take questions.
[The prepared statement of Dr. Shih follows:]

**House Foreign Affairs Subcommittee on
Europe, Energy, the Environment and Cyber**

Hearing on Transatlantic Cooperation on Critical Supply Chain Security

January 19, 2022

Written Testimony of Willy C. Shih

Robert & Jane Cizik Professor of Management Practice in Business Administration

Harvard Business School

Boston, MA 02163

Chairman Keating, Ranking Member Fitzpatrick, members of the Committee, and distinguished guests, thank you for the opportunity to address you today.

I am on the faculty of the Harvard Business School, where I have taught for the past 15 years. Prior to that I spent 28 years in industry, doing product development and manufacturing during a time when the globalization of supply chains really took root. After I started my first job out of school in November 1979, I spent much of the next decade working with European partners and suppliers, and during subsequent years I have had factories in the U.S., Europe, Asia, and Latin America reporting to me. When I teach about operations management and supply chains at the school, I come from the perspective of one who has studied both the theory and lived the practice.

What I hope to convey today is some of the basic logic around why supply chains are structured the way they are, how the U.S. is deeply interconnected at so many levels to Europe, and why I believe a more nuanced understanding of these connections can help us to build a more robust partnership with Europe and more resilience for ourselves.

I think the most important concept to understand is supply chain tiering, the consequences of which were really highlighted during the pandemic (**Exhibit 1**). For pretty much any product, a final assembler is fed by a network of suppliers, who in turn are fed by their own networks of suppliers, and so on. In many industries like automotive, this can go as much as nine layers deep or even more. This helps explain many of the disruptions we have experienced, as you only need to lose one supplier somewhere in those tiers to make it difficult or impossible to assemble your product. And many of those suppliers are connected by logistics links that span the globe.

Why do we have this tiering? The most important reasons are technological complexity and the benefits of specialization. In most technology-intensive industries, it is impossible for one organization to not only do everything itself, but to also be the very best in the industry at everything needed at the same time. Rather, you want to be able to choose from companies who are the best at making each of those components. If you look at a modern notebook computer (**Exhibit 2**), being the best at designing the processor requires different skills than designing the best disk or solid state storage drives, and a whole different set for manufacturing the battery, keyboard, or flat panel display. If you visit the factories of these manufacturers, as I have, you immediately see how different the capabilities needed for each of them are (**Exhibit 3**).

One consequence of this is that supply chains have a global reach, and European companies often are critical links. A great example is the global semiconductor value chain. In this chart (**Exhibit 4**), I show the most critical links in the production of leading edge semiconductor chips like the ones in your iPhone or notebook computer. The Dutch company ASML has gotten a lot of attention for being the only source for those \$150 million plus extreme ultraviolet (EUV) lithography machines that are used by companies like TSMC to make chips in Taiwan, and maybe next year in Arizona. Those machines use an optical engine that is manufactured by Zeiss in Oberkochen, Germany, which incorporates Bragg reflector assemblies that in my opinion probably only Zeiss has the capability to engineer, or at least they have a 10 year plus lead over anyone else in the world. That scanner also uses an amazing 13.5 nanometer laser plasma light source made by Cymer in San Diego. ASML worked closely with IMEC in Belgium and Albany NanoTech in New York to perfect these machines.

ASML assembles scanners in the Netherlands, and then ships them all over the world, to places like TSMC Fab 12, 14, 15, or 18 in Taiwan, where they produce wafers filled with chips designed by Apple, Intel, AMD, Nvidia, or Qualcomm using software design tools from Synopsys or Cadence, and they ship finished wafers to outsourced assembly and test facilities across Asia to be packaged and tested before going to circuit board assembly lines in China where they are put into phones and computers and all sorts of things. It is truly a miracle of global cooperation and coordination, and you can see the critical role of European firms.

One of the other benefits of these global supply chains is that producers can develop scale efficiencies and leverage cost advantages of being in one location or another. Last year I worked on a project in which we tried to trace the supply chains of generic pharmaceuticals, and while this is generally opaque, we made some progress on for steroid drugs (**Exhibit 5**). You'll see in this chart that a key precursor for many steroid drugs is 4-androstenedione, and I was surprised to find that even many Chinese and Indian makers sourced it from Germany. In this little corner of the pharma active pharmaceutical ingredient (API) market, as well as in another study I did on consumer toiletries, I was intrigued to find EU companies occupying prominent roles in many chemical supply chains. If you go back to the notebook computer example I started with, Merck KGaA in Darmstadt, Germany is the global supplier of the critical liquid crystal material that makes all of those displays work. I visited their factory a number of years ago, and it was an amazing place. EU companies play an essential role in many areas. I visited the Novo Nordisk facility in Kalundborg, Denmark five years ago where I saw

half the world's supply of insulin being manufactured, and I also visited Chr. Hansen, who makes the cultures and enzymes for yogurt and cheeses consumed daily by 1.5 billion people globally, including probably most of the ones you find in supermarkets here. When you are making chemicals, or growing cultures, scale translates into lower costs and economic efficiency.

With these interconnections, we also have to be careful to understand the implications of our trade policies (**Exhibit 6**). I was talking to the CEO of Long-Stanton Manufacturing Co. a few years ago. The company has been in metal fabrication since 1835, and this is a tooling fixture (show) that he gave me a few years ago. They use it when they manufacture brackets for the carbon fiber brakes in the landing gear of the Boeing 787. They buy the steel from Voetsalpine in Austria, and then they ship finished parts to Safran Landing Systems in the U.S. and France. Safran assembles the gear, and ships it to North Charleston, South Carolina where Boeing assembles them into aircraft. There is a lot of aerospace trade between Europe and the U.S., whether its European made components for Boeing aircraft designed with Dassault Systèmes software and assembled here, or American made components like engines, actuators, avionics, auxiliary power units, and countless other components going there. Those brake units have to dissipate a tremendous amount of energy in a rejected take-off, so the steel is a special high-performance alloy. When we imposed steel tariffs a few years ago, Long-Stanton tried to find a domestic source, but there were none to be found. Voetsalpine is the only supplier qualified by Boeing and Airbus. Faced with sudden cost increases, the company had to scramble as Safran looked for other options. Sure Long-Stanton could file for an exemption, but that was a lengthy process, and I remember this was an existential crisis for them.

Europe and the U.S. are highly interconnected, and interdependent. While we are still a technology leader, global R&D spending and leadership are much more distributed than they were 50 or 30 years ago, when it disproportionately favored the U.S. If we were to view the EU and North America plus some East Asian allies together, you would have very comprehensive coverage of all of the advanced technologies I can think of. Partnership with Europe makes a lot of sense – one in which we work together to ensure more resilience and mutual benefit. I think cooperation with Europe is critical to American competitiveness, both now, and in the future.

Thank you very much. I would be happy to answer your questions.

Mr. KEATING. Thank you very much, Doctor.

Dr. Chad Bown is the Reginald Jones Senior Fellow at the Peterson Institute of International Economics.

Dr. Bown has previously served in the Obama Administration and at the World Bank.

Dr. Bown, you are recognized for 5 minutes.

STATEMENT OF DR. CHAD P. BOWN, REGINALD JONES SENIOR FELLOW, PETERSON INSTITUTE FOR INTERNATIONAL ECONOMICS

Dr. BOWN. Thank you, Chair Keating, Ranking Member Fitzpatrick, and the subcommittee for the invitation. It is a pleasure to testify in front of you again today.

Today, I am going to briefly describe early lessons from my research on transatlantic policy and cooperation impacting two critical, but very different supply chains now in flux. Those are COVID-19 vaccines and semi-conductors.

For the record, my written testimony also describes insights from my research on personal protective equipment or PPE. COVID-19 vaccine manufacturing supply chains are an incredibly important example for transatlantic cooperation. The speed of scientific advancement in the supply chains that emerged across the Atlantic, especially for Pfizer-BioNTech, Moderna, and Johnson & Johnson, they were extraordinary.

Pfizer's vaccine would not exist without the BioNTech invention in Germany. The Johnson & Johnson vaccine was codeveloped at a Janssen lab in the Netherlands, and its Leiden plant provided drug substance to the U.S. market through much of 2021. Moderna's mRNA vaccine in use across Europe is being bottled in France and Spain after its drug substances manufactured at a plant in Switzerland.

Policy played a sizable role at incentivizing rapid vaccine research, development, and manufacturing, but it also could have done better. Through Operation Warp Speed in the Defense Production Act, the U.S. Federal Government allocated funding to scale up manufacturing at risk and over the entire vaccine manufacturing supply chain, including some critical raw materials and equipment.

Despite the U.S. subsidies, though, many key inputs have been in scarce supply in the United States, Europe, and globally. DPA gave U.S. policymakers some visibility into those supply chains to help ration inputs to plants manufacturing priority vaccines in the United States. But they lacked visibility into the supply chains in Europe and elsewhere.

This created needless policy conflict, including initial accusations, that were subsequently refuted with data, that the United States had imposed an export embargo on vaccine inputs. Additional transparency, information sharing, and cooperation with key partners was needed to secure those supply chains and better ration inputs in short supply.

The U.S. and EU began cooperating informally in March 2021 to resolve vaccine supply chain bottlenecks, though, their Joint Task Force was only formalized in September. Lessons from that initia-

tive should be shared with other transatlantic supply chain resilience initiatives.

Semi-conductors, my second area, are the ubiquitous chips used as inputs in most everything. Semi-conductor supply chains have been under scrutiny lately because demand has spiked. With too few chips, the automotive sector, as well as others, have been forced to cut production of their goods.

Semi-conductor supply chains, though, were under stress well before the pandemic. Beginning in 2018, the U.S. Administration imposed 25 percent tariffs under Section 301 of the Trade Act of 1974. Imports from China fell by billions of chips per year. The Administration then imposed unilateral and extra territorial export controls on semi-conductors, as well as semi-conductor manufacturing equipment for certain Chinese firms for national security and related reasons.

This triggered hoarding and other market disruptions. And these policies mostly remained unchanged today.

Congress has been considering legislation, for example, the CHIPS Act and FABS Act that could result in tens of billions of dollars of subsidies to the industry. Europe is considering a potentially European CHIPS Act. In the U.S. legislation, some subsidies may be one-off incentives to locate or expand production facilities in the United States, potentially offered on a nondiscriminatory basis to both American and foreign headquartered firms.

Some could be investment tax credits to fund R&D, but some subsidies may be tied to production of legacy or these older node chips that are critical for sectors like autos. However, such funding may be needed in perpetuity if those semi-conductors could not be manufactured profitably in the United States or in another trusted supplier country.

Nevertheless, recent reports suggest car makers and semi-conductor manufacturers may be undertaking long-term contracting arrangements and partnerships to fix that particular problem on their own without subsidies.

To reduce the chance of policy failure, the U.S. and Europe should cooperate on a semi-conductor supply chain resilience policy, including through the new Trade and Technology Council, or the TTC. That means coordinating on export controls so the United States is not imposing them unilaterally, as well as on any subsidies to highlight R&D and to ensure diversification across nodes, suppliers, and locations and to reduce the chance of a subsidy war.

However, I also worry about the U.S. and Europe suddenly giving up the fight against other countries' semi-conductors subsidies as we used to do through multi-lateral institutions like the World Trade Organization.

Both are naive to think that places like Taiwan, South Korea, Japan, and, of course, China would not respond with additional government support. A result could be global overcapacity, allegations of dumping tariffs in market segmentation.

Finally, the experiences of semi-conductors and COVID-19 vaccines argue strongly against the purely domestic supply chains and autarky. For semi-conductors, the February 2021 winter storm in Texas knocked American plants run by NXP and Infineon, two major chip providers to the auto industry, offline.

For COVID-19 vaccines, when the FDA shut down the Emergent BioSolutions facility in Maryland for 4 months in 2021 for quality control problems, transatlantic trade meant that Americans got access to drug substance for the J&J vaccine from a Dutch plant. Trade in these sectors has been critical throughout the pandemic. Supply chain resilience thus means additional transparency, inventory management, and diversified sourcing with trusted partners, as well as a commitment to quickly engage and cooperate on policy when an emergency strikes, especially to expand production.

Transatlantic supply chain resilience policy is still a work in progress, but cooperation with the EU, especially through the TTC, should be encouraged to ensure we do it even better in the future.

Thank you, and I am happy to take any questions.

[The prepared statement of Dr. Bown follows:]

Transatlantic Cooperation on Critical Supply Chain Security

Chad P. Bown*

Reginald Jones Senior Fellow

Peterson Institute for International Economics

Testimony before the *House Committee on Foreign Affairs*

Subcommittee on Europe, Energy, the Environment and Cyber

January 19, 2022

Thank you for the invitation, it is a pleasure to testify in front of you again. Today I will briefly describe early lessons from my research on transatlantic policy and cooperation impacting three critical, but very different, supply chains now in flux: COVID-19 vaccines, semiconductors, and personal protective equipment.

COVID-19 vaccine manufacturing supply chains are an incredibly important example for transatlantic cooperation. The speed of scientific advancement and the manufacturing supply chains that emerged across the Atlantic – especially for Pfizer-BioNTech, Moderna, and Johnson & Johnson – were extraordinary.¹ Pfizer’s vaccine would not exist without the BioNTech invention in Germany. The Johnson & Johnson vaccine was co-developed at a Janssen lab in the Netherlands, and its Leiden plant provided much of the drug substance for the U.S. market in 2021. Moderna’s mRNA vaccine in use across Europe is being bottled in France and Spain, after its drug substance is manufactured at a plant in Switzerland.

Policy played a sizable role at incentivizing rapid vaccine research, development, and manufacturing, but it also could have done better.² While Europe relied mostly on advance purchase agreements, the United States used Operation Warp Speed and the Defense Production Act. Washington allocated more funding to scale up manufacturing at risk and over the entire vaccine manufacturing supply chain, including some critical raw materials and equipment.³ Despite the U.S. subsidies, many key inputs have been in scarce supply in the United States, Europe and globally. The Defense Production Act gave U.S. policymakers some visibility into those supply chains to help ration inputs to plants manufacturing priority vaccines in the United States, but they lacked visibility into supply chains in Europe and elsewhere. This created

* Contact: Peterson Institute for International Economics, 1750 Massachusetts Avenue NW, Washington DC 20036 USA, email: cbown@piie.com, web: www.chadpbown.com.

¹ See Chad P. Bown and Thomas J. Bollyky. Forthcoming. [How COVID-19 vaccine supply chains emerged in the midst of a pandemic](#). *The World Economy*.

² See Chad P. Bown. Forthcoming. [COVID-19 vaccine supply chains and the Defense Production Act](#), manuscript.

³ See Chad P. Bown and Thomas J. Bollyky. 2021. [Here’s how to get billions of COVID-19 vaccine doses to the world](#). *PIIE Trade and Investment Policy Watch*, March 18.

needless policy conflict, including initial accusations – subsequently refuted with data – that the U.S. had imposed an “export embargo” on vaccine inputs.⁴

Additional transparency, information sharing, and cooperation with key partners was needed to secure these supply chains and better ration inputs in short supply.⁵ The U.S. and EU began cooperating informally in early March 2021 to resolve vaccine supply chain bottlenecks,⁶ though their joint task force was only formalized in September. That positive effort should be deepened and lessons shared with other transatlantic supply chain resilience initiatives.

Nevertheless, both the U.S. and EU engaged in “vaccine nationalism,” as expected.⁷ Each failed to export enough final finished doses of vaccines quickly, to build on and support COVAX, and to follow global public health objectives by prioritizing health care workers and the most vulnerable populations globally, to reduce the likelihood of emergence of variants.

Semiconductors are the ubiquitous chips used as inputs in most everything. Semiconductor supply chains have been under scrutiny lately because demand has spiked. With too few chips, the automotive sector and others have been forced to cut production of their goods.

Semiconductor supply chains were under stress well before the pandemic. Beginning in 2018, the U.S. administration imposed 25% tariffs under Section 301 of the Trade Act of 1974; imports from China fell by billions of chips per year. The administration then imposed unilateral and extra-territorial export controls on semiconductors as well as semiconductor manufacturing equipment to certain Chinese firms for national security and related reasons; this triggered hoarding and other market disruptions.⁸ These policies mostly remain unchanged today.

At the moment, the U.S. Congress is considering legislation – e.g., the CHIPS Act and FABS Act – that could result in tens of billions of dollars of subsidies to the industry. Europe is considering a potential European Chips Act. In the U.S. legislation, the exact funding is not yet settled. Some subsidies may be one-off incentives to locate or expand production facilities in the United States, potentially offered on a nondiscriminatory basis to both American- and foreign-headquartered firms. Some could be investment tax credits to fund R&D. But some subsidies

⁴ See Chad P. Bown and Chris Rogers. 2021. **The US did not ban exports of vaccine supplies. But more help is needed.** *PIIE Trade and Investment Policy Watch*, June 7.

⁵ See Thomas J. Bollyky and Chad P. Bown. 2021. **The Real Vaccine Procurement Problem: Why America Should Make Its Supply Chain More Transparent.** *Foreign Affairs*, June 24.

⁶ See Chad P. Bown. 2021. **Don't let CureVac's COVID-19 vaccine supply chain go to waste.** *PIIE Realtime Economic Issues Watch*, August 9.

⁷ See Thomas J. Bollyky and Chad P. Bown. 2020. **The Tragedy of Vaccine Nationalism: Only Cooperation Can End the Pandemic.** *Foreign Affairs* v99, n5: 96-109; as well as Thomas J. Bollyky and Chad P. Bown. 2020. **Vaccine Nationalism Will Prolong the Pandemic. A Global Problem Calls for Collective Action.** *Foreign Affairs*, December 29.

⁸ See Chad P. Bown. 2020. **How the United States marched the semiconductor industry into its trade war with China.** *East Asian Economic Review* v24, n4: 349-388; and Chad P. Bown. 2021. **The Missing Chips: How to Protect the Semiconductor Supply Chain.** *Foreign Affairs*, July 6.

may be tied to production of “legacy” – or older node – chips that are critical for sectors like autos; such funding may be needed in perpetuity if those semiconductors cannot be manufactured profitably in the United States or in another trusted supplier country. Yet, recent reports suggest carmakers and semiconductor manufacturers may be making strategic arrangements and contracting to fix the problem on their own, without subsidies.⁹

These types of legislation could be an unprecedented foray into industrial policy for both the United States and EU. One concern is the difference between the lightning speed at which the industry operates and technology evolves, and the much slower speed with which governments change policy. Policymakers also lack access to detailed data on what is produced where and by whom, as well as real-time demand information revealing which automobile, medical device, consumer electronics or other company is running short on chips at any moment in time.

To reduce the chance of policy failure, the U.S. and EU should cooperate on a semiconductor supply chain resilience policy, including through the new Trade and Technology Council.¹⁰ That means coordinating on export controls – so the United States is not imposing them unilaterally – as well as on any subsidies to highlight R&D and to ensure diversification across nodes, suppliers and locations, and to reduce the chance of a subsidy war. However, I also worry about the U.S. and EU suddenly giving up the fight against other countries’ semiconductor subsidies.¹¹ Both are naïve to think places like Taiwan, South Korea, Japan, and of course China would not respond with additional government support. A result could be global overcapacity, allegations of dumping, tariffs, and market segmentation.

Personal protective equipment is a third critical supply chain. Both the U.S. and Europe experienced PPE shortages early in the pandemic and imposed export control policies. Furthermore, the United States also eventually allocated over \$1 billion of subsidies to expand capacity across its domestic PPE supply chain, not just for products like surgical masks and gloves, but also critical inputs like fibers, rubbers and filters needed to manufacture them.¹²

A domestic PPE industry in the United States has emerged. Many companies that did not receive government support also responded to price signals by entering the market. However, as the pandemic recedes and prices eventually fall, some of the U.S. industry may find it difficult to compete with lower cost imports, primarily located in China. Yet, the early days of the pandemic

⁹ See [Ford, GM Step Into Chip Business](#). *Wall Street Journal*, November 18, 2021; [Stellantis, Foxconn Partner to Design and Sell New Flexible Semiconductors for Automotive Industry](#). Press release, December 7, 2021.

¹⁰ See Chad P. Bown and Cecilia Malmström. 2021. [A Chance to Preserve the World They Made: America and Europe Seek to Revive Trade Ties](#). *Foreign Affairs*, October 7, and Chad P. Bown and Cecilia Malmström. 2021. [What is the US-EU Trade and Technology Council? Five things you need to know](#). *PIIE Trade and Investment Policy Watch*, September 24.

¹¹ See OECD. 2019. [Measuring Distortions in International Markets: The Semiconductor Value Chain](#). *OECD Trade Policy Paper 234*. Paris: OECD Publishing.

¹² See Chad P. Bown. 2022. [How COVID-19 medical supply shortages led to extraordinary trade and industrial policy](#). *Asian Economic Policy Review* 17, no. 1: 114-135.

revealed an excessive global concentration of residual supply in China. (China's export expansion beginning in April 2020 eventually saved many lives globally; unfortunately its export shortfall during the pandemic's early days like cost lives.) Cooperating over PPE supply chains provides another opportunity for the United States and Europe to encourage diversification, as well as potentially on procurement, inventory management and stockpiling, as well as regulatory policy.

Finally, the experiences of semiconductors, COVID-19 vaccines and PPE all argue strongly against purely domestic supply chains and autarky. For semiconductors, the February 2021 winter storm in Texas knocked NXP and Infineon – two major chip providers to the auto industry – offline. For COVID-19 vaccines, in the early days of production, BioNTech's German plants were getting bags of filtered mRNA from Pfizer's plant in Massachusetts. And again, when the Emergent BioSolutions plant in Maryland was shut down for four months in 2021 for quality control problems, transatlantic trade meant that Americans got access to drug substance for the Johnson & Johnson vaccine from a Dutch plant.

Trade in these sectors has been critical throughout the pandemic. Seemingly no one has been spared the need to lock down at some point, and there have been numerous other unexpected challenges brought on by weather, fire, or other unforeseen events. Policymakers must resist calls for excessive concentration of production *domestically*, which could create even more vulnerabilities.

Supply chain resilience thus means additional transparency, inventory management, and diversified sourcing with trusted partners, as well as a commitment to quickly engage and cooperate on policy when an emergency strikes, especially to expand production.

Transatlantic supply chain resilience policy is still a work in progress, but the signs of cooperation with the European Union – especially through the TTC – are there to ensure we do it better in the future.

Thank you, and I am happy to take any questions.

Mr. KEATING. Thank you, Doctor.

Dr. Derek Scissors is a senior fellow and economist rather with American Enterprise Institute.

Dr. Scissors currently serves on the U.S.-China Economic and Security Review Commission. Thank you for joining us, Dr. Scissors.

You are now recognized for 5 minutes.

**STATEMENT OF DR. DEREK SCISSORS, SENIOR FELLOW,
AMERICAN ENTERPRISE INSTITUTE**

Dr. SCISSORS. Thank you, Mr. Chairman. I should say at the outset that I am not claiming to be a Europe expert. I will claim to be a China expert, and I will try to show why a China expert should be speaking today.

My main observations start with how to deal with China. China is often competitive on its own. When it is not competitive, it will often subsidize its way as it desires into any supply chain where they set a national priority. No genuinely commercial business can compete with the extent of possible Chinese subsidies.

We cannot match them here. The Chinese are better at subsidies than we are, thankfully, but a downside is they can drive us out our firms or European firms out of critical supply chains if they so choose.

If Congress does not want China to participate in a critical supply chain, the Chinese firms have to be cut out by law, both their production in China and overseas production by their firms. Measures short of that such as tax breaks will not work when China sets a national priority. They will subsidize right through our incentives.

The fact is this will be costly for us and it will be even harder for countries that do not see China as a major threat. We shouldn't further raise the cost for everyone by also cutting our friends out from supply chains. Not our treaty allies and not our FTA partners.

This group certainly features but is not limited to the United Kingdom and much of the EU. Xi Jinping would be very pleased that the West got into a fight over supply chains. We should work for the opposite outcome. A last general observation, supply chain problems are not just COVID.

For example, in 2018, Congress was correctly concerned about the dominance of Chinese chemicals used in active pharmaceutical ingredients. COVID did show that even friendly countries will compete over supply in a crisis and this is important in terms of how much U.S. supply is needed and being prepared enough to help our friends when they need it, but even if COVID were to end this year in terms of its impact on supply chains, we would be back to China's potentially dangerous role in critical chains as recognized by the committee.

A few remarks on Europe. As noted already today very well, Europe is the most important of our partners due to its size and its technological competitiveness. Unfortunately, the reality is much of Europe does not see China as a serious security threat. If we treat Europe as a partner, when we consider limiting China's role or eliminating it in critical chains, they will benefit from relocation of that activity to some extent and will cooperate more.

If we do not treat Europe as a partner, they may refuse to join us in our actions to change supply chains. They may set up their own protective chains as I believe Chad just suggested. The example that everyone is using is chips. I will use it too briefly.

We know from just today's discussion of Dutch firm ASML that we must include equipment makers as part of supply chains, even if they do not make any components in the product. If they provide the equipment, they have to be part of the—considered as part of the change or chains.

Elkem, which is a Norwegian company provides silicon in the chip making process. Arm of the U.K. can be an advanced manufacturer and has already faced a rogue China subsidiary, in part, because the Chinese Government will accept or even encourage economic actions whether they are illegal or legal to bring in chip technology.

These firms need to be allowed to participate in U.S. chains. If not, it is going to hurt any effort of ours because we will reduce European cooperation. It is reassuring to see this issue in the Trade and Technology Council, which is Representative Fitzpatrick has noted has risk of joining a large pile of empty talk shops going back years.

We cannot afford that. We need the TTC to work and it is good to see them considering semi-conductors. Another example is solar. Europe has high concerns, interest in alternative energy. They do not want to depend on the Chinese in a climate change fight and cooperation here between the U.S. and Europe should be possible, although will not be easy.

I want to close with a set of U.S. policy specifics, because we are not going to convince Europe or anyone else to take difficult action if we are not willing to do so. So a problem here is American firms are selling China valuable technology and American financials are investing in Chinese firms. That can undermine U.S. credibility on the supply chain issue. It certainly makes it harder to establish independent supply chains because it makes China more competitive.

Export controls are an example. There was a bipartisan vote—overwhelming bipartisan vote for export control reform in 2018, but the Bureau of Industry and Security at the Department of Commerce has not taken a single action to control foundational technology, which was mandated in the export control reform.

I will give you an example of foundational technology. Most medical equipment could be considered foundational technology. Right now we do not have to worry about harmonizing our export controls with Europe because we haven't taken any steps on foundational controls, foundational technology that need to be harmonized. That is not a good outcome.

Perhaps an even bigger problem, from 2016 to 2020, new American investment in Chinese stocks and bonds, which supports Chinese companies, stood at \$780 billion. It tripled over the previous level at the end of 2015. It is also about the same size as the current U.S. defense budget. It is a lot of money, American money, that is supporting Chinese firms. And I cannot tell you in what sectors it's supporting there because we do not have that information in public. The Department of Treasury does not publish it.

The solution in the face of these challenges is not sweeping bans right away; it is that Congress decides where our priorities lie, where we need to secure supply chains, cut the Chinese out, and certainly not help them become more competitive.

I read the National Critical Capabilities Defense Act, which was introduced on a bipartisan basis in the House last month, as a valuable step in this direction. This is not to say the bill is ideal, but I think everybody here understands that we are overdue for action on supply chains and the first step is for Congress to set priorities starting this year. These priorities certainly could include semi-conductors, they could include COVID-related medical supplies, they could include active pharmaceutical ingredients.

We need to take actions quickly to move these chains toward independence of Chinese supply, because that will not be easy or fast. So we need to start the process now.

A last example, China has not been able to sustain movements in markets for rare earth elements, but it is still trying. Recently, there was a major merger of rare earth subsidiaries of very large Chinese State-owned enterprises. There is a bipartisan Senate bill on not using Chinese rare earths in defense. I think it was introduced last week. That is certainly the right idea. China should not be in any defense supply chains.

While these steps are being taken by the Congress, if the executive branch is willing, they should be brought on the TTC as priorities. Obviously, Europe will have a response, but as I mentioned at the outset, we should not be cutting Europe out of these chains. So I hope that response is cooperative.

In my view, this is proper congressional guidance on trade. It could be viewed—and I hate to bring this word up because it is controversial, but it could be viewed as a narrow form of trade promotion authority where Congress tells the President we want you to consider these trade issues in the TTC.

The Trump and Biden Administrations have only talked about supply chains over the last 2 years, which I find very unfortunate. We need strong congressional action of some sort urgently.

Thank you, and I would be happy to answer questions.

[The prepared statement of Dr. Scissors follows:]

Testimony on “Transatlantic Cooperation on Critical Supply Chain Security”

January 19, 2022

House Foreign Affairs Committee

Subcommittee on Europe, Energy, the Environment and Cyber

by Derek Scissors

Main Points

Looking at global supply chains through the China lens generates three general and vital observations:

First, cutting China out of a supply chain must be done by mandate, not by financial or other incentives. China is often economically competitive and, when not, it has the world's most extensive subsidies scheme available to push into any supply chain considered to be a national priority. No genuinely commercial American or European business can compete with the range of subsidies China can bring to bear -- tax incentives and other support for those businesses will be overwhelmed. Where Beijing has set a national priority, production in China and by Chinese enterprises overseas must be banned by law or they will continue to participate.

Second, securing supply chains in this way will be costly for the US and unappealing for countries that do not see China as a major threat. The US should not raise costs for everyone by cutting our allies and close economic partners from supply chains along with China. These allies and close economic partners certainly include UK and much of the EU. China wants to split the transatlantic partnership, the US should not bring that goal closer.

Third, the problems in global supply chains certainly extend beyond Covid. Pre-Covid, Congress was rightly concerned about the dominance of Chinese chemicals in the manufacturing of active pharmaceutical ingredients (API), for example. The pandemic shows that even friendly countries will compete over supply in a crisis. This is important to American preparation, both for ourselves and "over-preparing" so that we can assist our friends in the next crisis. But if even Covid's impact on supply chains ends this year, China's ability to interrupt key chains will remain and evolve, as Beijing resets what it thinks is most important.

Relations with the EU

Taken as a whole, Europe is the most important of our economic partners, due to its size and technological competitiveness. NATO is also the most important security alliance. Unfortunately, most of Europe does not see China as a major security threat. If the US treats Europe as a partner in cutting China out of certain supply chains, Europe can benefit to some extent in the relocation of economic activity. This prospect will encourage cooperation. If America does not work to include Europe, countries may choose to keep their supply chains running through China, regardless of how that affects the US, or set up protected chains of their own.

Semiconductors are an illustration. The US has correctly pressured Dutch company ASML not to sell top-of-the-line equipment to China. It is important to include equipment-makers when considering supply chains, even if they make none of the products involved because they can make participants in the chains more or less competitive. In addition, Norway's Elkem is a silicon manufacturer. Britain's Arm is not only an advanced manufacturer of semiconductors, it has faced a rogue Chinese subsidiary, which went rogue in part because the Chinese government encourages illegal or quasi-illegal acts if they bring in chip technology.

These firms should definitely be allowed to participate in semiconductor supply chains that serve the US, as long as they are willing to follow any rules regarding China. It would hurt efforts to limit Chinese participation in semiconductor chains if Europe did not cooperate and, in return, these supply chains should not just be based in the US or North America. This is an excellent area for work by the US-EU Trade and Technological Council (TTC). Another example is solar energy, where Europe especially should not want to depend on China. But the US will not win cooperation from Europe or anyone else if we're not willing to act ourselves.

American Policy Priorities

Selling China valuable technology and investing in their firms undermines American credibility on supply chains and makes it more costly to establish independent chains because it makes China more competitive. The Congress voted on an overwhelming bipartisan basis in 2018 to reform export controls, including controlling foundational technology such as a good deal of medical equipment. The Department of Commerce's Bureau of

Industry and Security has not taken a single action with regard to controlling foundational technology. Sadly, there is no problem harmonizing controls with Europe in this area because we do not have any controls. There is a clear problem of the US assisting Chinese firms to outcompete American participants in medical and other supply chains.

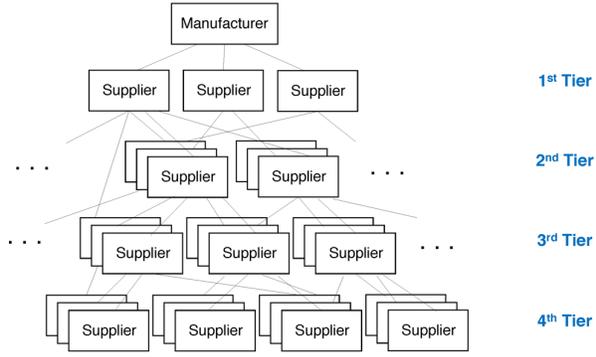
Adding to this challenge, from 2016 to 2020, there was \$780 billion in new US investment in Chinese stocks and bonds, thus funding Chinese enterprises. The stock of investment more than tripled. The Department of the Treasury does not publish information on what sectors this money supports, but all of those sectors are more competitive than they would otherwise be. The US again has helped China enter or dominate supply chains.

Congress should decide what products matter most, where we must secure supply chains and stop boosting Chinese competitiveness. The National Critical Capabilities Defense Act, introduced on a bipartisan basis in the House last month, is a valuable step in this direction (which is not to say it's ideal). In general, Congress should choose a few 2022 priorities and take actions to quickly move the associated supply chains toward full independence from Chinese participation.

Semiconductors and medical supplies such as API have already been mentioned. Another possibility is some rare earth elements (REE). China has not yet been successful in controlling REE markets but it is continuing to try, most recently with a merger of the REE business of large state-owned enterprises. A bipartisan Senate bill was introduced last week banning the use of Chinese REE in defense purchases and it is certainly true that China should not participate in any defense supply chains.

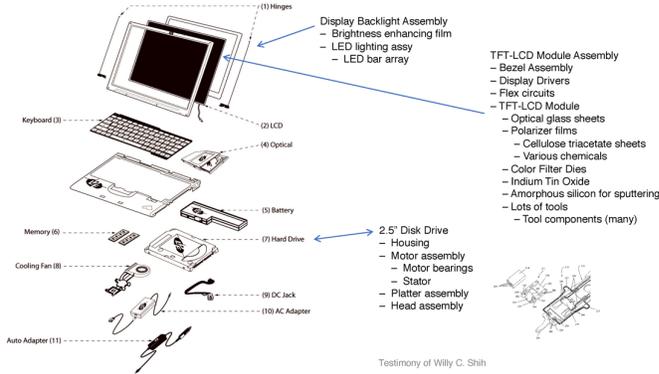
Finally, when Congress sets its priorities and while the implementing steps are being taken, the executive branch should be encouraged to bring these priorities into the TTC. This Congressional guidance on trade could win bipartisan support. The Trump and Biden administrations (thus far) unfortunately only talk about supply chain independence, no action has been taken even two years after the blows from Covid first began to be felt. There is an urgent need for strong Congressional action.

Deep Supply Chain Tiering

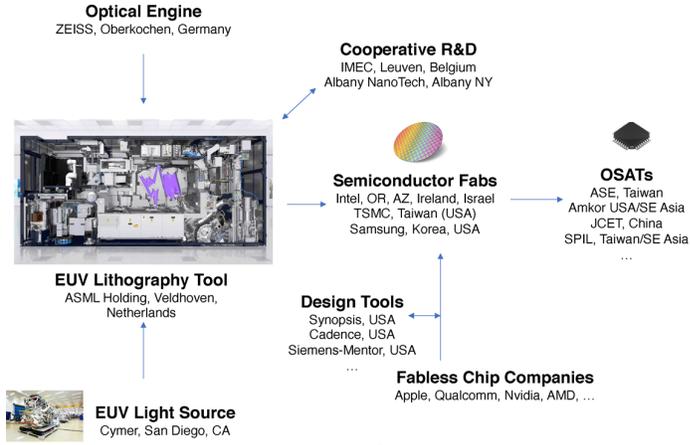


Testimony of Willy C. Shah

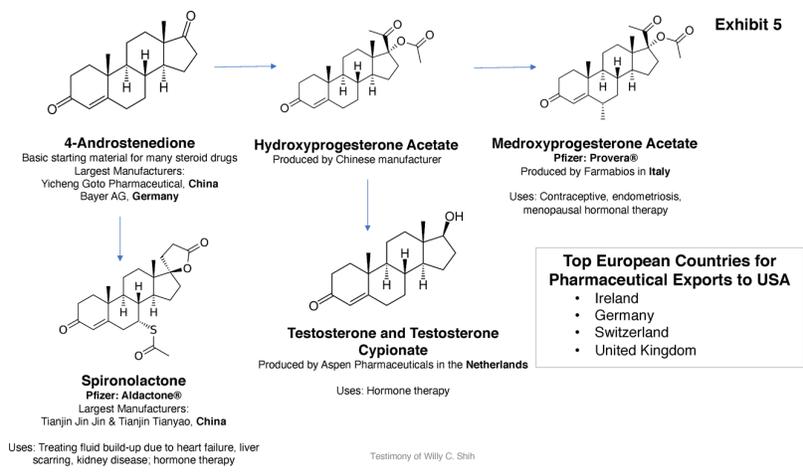
Specialization







Testimony of Willy C. Shih





Voestalpine – High Performance Metals
Linz, Austria
High performance metals
ONLY approved base metal source
NO domestic supplier can meet Boeing/Airbus specifications



Long-Stanton Manufacturing Co.
West Chester Township, Ohio
Manufactures mounting bracket for carbon fiber brakes on Boeing 787 (and other commercial aircraft)



Boeing 787 Final Assembly
North Charleston, South Carolina
Photo: Post & Courier



Messier-Bugatti-Dowty – Safran Landing Systems
Vélizy-Villacoublay, France
Incorporates brackets in carbon fiber brakes, integrates brakes into landing gear
Photos: Safran Landing Systems

Testimony of Willy C. Shih

Mr. KEATING. Thank you, Dr. Scissors. And thank all of you for your testimony. I think you gave us just a bit of an understanding how complex this issue is and hopefully we will be able to, during our questioning period, draw out some more specifics.

I will now recognize members for 5 minutes each. And pursuant to House rules, all time yielded is for the purpose of questioning our witnesses. Because of the virtual format of this hearing, I will recognize members by committee seniority, alternating between Democrats and Republicans.

If you miss your turn, please let our staff know and we will circle back to you. If you seek recognition, you must unmute yourself through your microphone and address the chair verbally.

I will now recognize myself for 5 minutes.

I give this question to Dr. Bown first. The others can come in. You touched on the idea that an example was the prior Administration, the Trump Administration. They went ahead with tariffs and at the time I heard from the smallest companies in my district to some of the industrial leaders in our country. In fact, without identification, one of our major automobile manufacturers set up great investment in the U.S. moved away from that and instead went to China because of the uncertainty around some of the trade issues.

To go ahead and deal with tariffs without doing their proper oversight before decisions were made to see what the impacts can be on our own business here in the U.S., I saw that happen in real-time.

What can we do as Members of Congress for Administration so that when these decisions are being made, there is more oversight and more of a recognition and the opportunity from those businesses affected, from the small businesses at the local level to our major global corporations to make sure they have input before final decisions are made so we do not repeat this mistake?

Start with Dr. Bown.

Dr. BOWN. So I think that is a wonderful question and an accurate depiction of what happened. I would say maybe two things. So first of all, when it comes to China and semi-conductors, not disagreeing at all with what others have said, China does subsidize its industry tremendously and with the aim of achieving, you know, not only autarky, but a huge global role.

That being said, you know, still China is not a major player at the high end of semi-conductors. It is a major player in the low end, high-volume chips. And as we have seen with the pandemic when it only takes missing one semi-conductor—does not have to be a complicated one, but one semi-conductor can, you know, prevent a car from rolling off the assembly line that can be a problem.

And so not knowing the impact of these policies up front is critical. So I think what can Congress do? Well, you know, it is hard. The last Administration, in my view, wasn't going to take much advice from anyone. Things like allowing—you know, it is always hard for consumers and, in this case, businesses, businesses of the consumers of a lot of these products that got tariffs put on them have a greater voice, small businesses especially in the process, allowing them to understand how they are going to be impacted and that is going to mean, you know, better access to data and information so that folks can be telling the story for them I think is key.

But aside from that, you know, it really would be reining in some of the executive's authority to be able to undertake the sorts of trade policies that we saw unilaterally in the last Administration, whether it was under Section 301, whether it was under the Section 232, national security tariffs on steel and aluminum, you know, that is rarely where, I think, Congress can weigh in and have a more interactive oversight constraining role on executive discretion there.

Mr. KEATING. Yes. I think that your point about the positions relatively percentagewise. I mean, the U.S. semi-conductor industry supply chain is about 39 percent of the total value of the global semi-conductor and if you put in Japan, Europe, especially the Netherlands, the United Kingdom, and Germany, Taiwan, and South Korea collectively, they contribute another 53 percent. And China, while contributing only 6 percent, is quickly developing capabilities and that is what we have to be careful of.

But I also, you know, to great attention—put great attention to what Dr. Scissors said, too. In the long run for our own economy, we just cannot have a race to the bottom with China. They are authoritarian. It is a government run business, and they can outlast us and put more supports in sector by sector. So we do not win by that.

So how do we balance this? We have seen in the pharmaceutical industry, we have seen with COVID, dealing with that pandemic, we have seen with semi-conductors, in particular, what happens and we are taking actions in our defense to build our own capacity, but how do you balance that off? How do we balance off the fact that we have to remain self-sufficient as a country?

Clearly, one solution is to work with our transatlantic allies and make it a bigger footprint, but also how can we not take actions that would indeed put China in a better competitive situation as Dr. Scissors said? Any suggestions how we can create that balance?

Dr. BOWN. Well, I think, it is hard in an industry like semi-conductors as Dr. Shih was describing. Some of the phases of that supply chain are extraordinarily labor intensive, and so they end up—the last step, in particular, of what is called offshore assembly packaging and testing. In many instances it is just—it is way too labor intensive to be able to do it competitively in probably either the United States or Europe.

So it does involve working with non-rich countries and making sure their supply chain engagement in our secure supply chains is there as well. Now you might ask who should those countries be. You know, it might be Mexico as part of USMCA. It might be other parties and other countries in East Asia through something like if we ever want to think about TPP or the CPTPP agreement as well.

So it is not just in these complicated supply chains where there is lots of fragmentation. It is not just us and Europe. It really is looking around and figuring out who we need to collaborate with in all parts of the supply chain to make sure it is more secure and ultimately cost competitive as well.

Mr. KEATING. Great. I hope we get questions later on on the distribution aspects, too, which are such a bottleneck right now.

I will now recognize Ranking Member Fitzpatrick for 5 minutes.

Mr. FITZPATRICK. Thank you, Chairman Keating.

I pose this question mainly for Dr. Scissors, but when his time is expired, if the rest of the panelists want to weigh in, I would appreciate that.

Sir, the United States and the EU represent roughly 21 percent of the world semi-conductor manufacturing capacity in 2020, but that does not consider inputs into the semi-conductor supply chain such as rare earth minerals. Can you try to unpack the supply chain and give us more context, particularly about the inputs to the semi-conductor fat process that are predominantly controlled by the Communist Chinese Party, rare earth extraction and processing, for example? And moreover, what actions should the EU bring and the United States take to ensure that this supply chain does not slip under the complete control of the CCP?

Dr. SCISSORS. I thank you, sir. I will try to be quick so others can join in. You know, I would say at this point you start at the materials end. The Chinese are involved in the supply chain for semi-conductors outside of China, primarily in my view at one end and the other, the materials end and the packaging end. And so the question is, you know, do we need materials from China to start the semi-conductor production process in a sense—I do not think the answer is yes as of yet.

We have to watch Chinese behavior in rare earths and other materials markets. China, as you may know, sir, is investing heavily in lithium and cobalt overseas. So they are going to look to have a dominant position in materials markets, but as far as I know—and I am glad to be corrected by my colleagues—that is not a concern at present.

On the other side, Chinese packaging is almost impossible to compete with partly due to subsidies, partly due to China's own competitiveness. This is a concern I have with new American plants where the supply could be interrupted, even though the chips have been produced, because they are all sent to China for packaging. And if you say, well, you know, we will try to create a packaging alternative, the Chinese will just subsidize right over it.

They may not have the cobalt onsite, but they can subsidize over a packaging competitor very easily, which is why I said the tool here has to be, not broad bans, but when the Congress thinks this is really critical to the United States, you simply cannot allow Chinese participation at all back to the equipment manufacturers, everybody in the supply chain. Because if you do, where they have an advantage now they will subsidize their way in.

And where they do not have an advantage, but they are looking for one such as in materials, they will also subsidize their way in.

One more comment to reinforce what I was saying earlier. We are shooting ourselves in the foot if we sell China advanced technology for short-term gain and then we have to face a tougher Chinese competitor down the line and set up a supply chain separate from them. And we are shooting ourselves in the foot, actually, even a little bit more if we give the Chinese the money to develop more advanced technology in China.

So this is a situation where I absolutely think we should be working with Europe. I think Europe has very similar incentives to us, at least up to a point on semi-conductors, but we need to look in the mirror and think about, like, what we are doing to help

China become more competitive in an area where we explicitly do not want them to become more competitive. And I will stop there.

Dr. SHIH. Could I weigh in here? I think one of the things we should be doing is, we should be investing in new process technologies. Every time there is a transition point and we are coming up on a transition point of the semi conductor industry because, as we know, Moore's law has been hitting the ceiling and, you know, as people go to three or four nanometer, you know, it is questionable how we are—what is going to happen next. But the clear frontier is an advanced packaging.

And a lot of that OSAT work not only happens in China, but the big players are actually in Malaysia and Vietnam as well. OK? And we have seen a lot of COVID outbreaks there, which has shut that down, OK, but that is the more labor intensive stuff.

Historically that packaging was there because it was more labor intensive, but as we go to new technologies that are more prone to like automation, you know, using for example Intel's tile technology and things like that, that is an opportunity where, you know, we can do a transition.

Similarly, for example, in chemicals. You know, 75 percent of all fine chemicals are manufactured in China. That was my point earlier about scale efficiencies and how they do that. The way you unseat that is you invest in continuous flow manufacturing and make all that established capacity obsolete. OK?

If you look back in history and other industries, every time there has been that type of technology transition that is how you grab the lead. I actually have hope on rare earths in the same way because one of the problems with rare earths is it is very polluting in terms of the processing. OK?

Rare earths themselves are not that rare; it is just the concentrations are not economic. And where the concentrations are higher is in some parts of China and they have done a lot of the processing stuff, but there is a lot of research work in how can I do it maybe using biological processing methods for extracting rare earths or other things.

You know, if we go back to technology leadership, OK, and really focus it on new processing technology, continuous flow manufacturing technology, and some of these other things, I mean, then we can take advantage of these transitions that are coming and, you know, kind of grab the lead back.

Mr. FITZPATRICK. Thank you to both of you.

Mr. Chairman, I yield back.

Mr. KEATING. Thank you. The chair recognizes vice chair of the committee, Representative Spanberger, for 5 minutes.

Ms. SPANBERGER. Thank you very much, Mr. Chairman.

I am a strong believer that the United States must ensure that we have the domestic production capacity to ramp up production of necessary medical countermeasures in the event of shortages or emergencies.

And so Dr. Shih, I was very pleased to hear you talk about APIs in your opening statement and in your written testimony. Unfortunately, 87 percent of facilities that produce the active pharmaceutical ingredients for essential generic medicines are overseas,

and as a result, our healthcare system suffers routine shortages of these medicines even outside of emergencies.

For example, the United States has lost the capacity to produce Penicillin here domestically and our reliance on foreign suppliers jeopardizes our ability to respond to future biosecurity threats and it causes routine shortages that put patients' care at risk. That is why I introduced the PREPARE Act, which is a bipartisan piece of legislation to identify the essential generic medicines that are necessary to have available at all times and then it authorizes the creation of a stockpile of active pharmaceutical ingredients to ensure that pharmaceutical supply chains can always produce the medicines, the essential medicines, that Americans need in the event of an emergency.

So Professor Shih, I appreciate your research on the economics of active pharmaceutical ingredient production. Could you discuss the economic barriers to domestic production of APIs and give your thoughts on how Congress may be able to overcome them?

Dr. SHIH. Well, thank you for the question. I think it is a very important question. I think there are several aspects of it. One is the distribution channel where a lot of the purchasing happens.

It is all done through group purchasing organizations and, you know, I have talked to a number of API manufacturers. They do not make a lot of money on the generics because—a lot of the GPOs, that is where they can earn more returns.

So they are very motivated by price and they will go to offshore suppliers, primarily India, you know, and a lot of those APIs will come out of China because of price. But your point on purchasing for the stockpile, especially if there is domestic manufacturer, I think would go a long way to foster domestic production with one caveat.

I also did a study on PPE during the crisis and one of the things that we found is a lot of small American manufacturers rose to the call from government officials, from business leaders, and everybody to manufacture PPE. By the time they ramped up, the Chinese had flooded the market with PPE masks, for example, or hospital gowns, sold below the cost of the materials of those American manufacturers could produce it.

So what we ended up doing is all these American businesses that rose to the call, the call to respond, ended up becoming positioned as swing producers. Now, if you are operating in the U.S., you are a higher cost producer, right, but as a higher cost producer, you cannot be a swing producer.

My view of the answer to that is, we have to give them stable production and buying for the stockpile is one way to do that. I am going to give you a long-term contract. I want you to produce for the stockpile. I will give you stable production. Use the overseas guys as a swing producer. do not use American companies as a swing producer.

So I think that would help a lot. And then as I said earlier on API production, we need to think differently about process innovation and the research is going on in the U.S. and there is some small startups that I visited who doing this API production with continuous flow, but we need to help these guys to be successful—

Ms. SPANBERGER. Professor Shih, you actually got to my second question, which was related to continuous manufacturing research. Because what I am hearing from your answer and from your comments is that this is an element of the challenge that encouraging the adoption of advancing manufacturing techniques is part of how we pivot into this next phase or ensure that we have the domestic production and create the need for the domestic production.

How could improved advanced manufacturing techniques like continuous manufacturing overcome some of these—the disincentives and I think we may be short on time, but—

Dr. SHIH. OK. I will give you a very quick answer. First of all, it reduces the scale economies. . Because the continuous flow manufacturing enclosed volume is very small. It is also very—is very susceptible to parameter tuning with things like machine learning in terms of, I have got to reduce my waste products and prove my yields and stuff like that.

I visited one of the startups in the Boston area that is doing this. A lot of this work came out of MIT. It is just remarkable. That is how we have to think about—you know, we are not going to play the same game against somebody who is subsidized. What we have to do is change the game.

Ms. SPANBERGER. Professor Shih, we have got some interesting innovation happening in central Virginia, so I would hope you might travel and visit us in the future.

Dr. SHIH. I would love to.

Ms. SPANBERGER. Then thank you so much for your time to all of our witnesses.

And Mr. Chairman, I yield back.

Mr. KEATING. Thank you, Representative. The chair now recognizes Representative Wagner for 5 minutes.

Mrs. WAGNER. I thank you, Chairman Keating, and thank our witnesses for joining us today.

The supply chain crisis has been a total disaster for families and for small businesses. So very many of my constituents in the second congressional district of Missouri are experiencing empty shelves and skyrocketing prices due to unacceptably long shipping delays.

As of Friday, January 14th, there were still more than 100 ships waiting to be unloaded at the Port of Los Angeles. Supply chain disruptions are directly tied to this Biden Administration and its failed policies. We have all called repeatedly to demand that the Administration take immediate action to resolve these unprecedented supply chain disruptions.

This is an issue that effects the daily life of every American, but it also is a matter of national security. China is aggressively working to become a global power as we have talked about semi-conductor industry and it already dominates the supply of rare earth minerals and active pharmaceutical ingredients.

The United States has an opportunity to work with like-minded partners as Dr. Scissors has said in Europe and elsewhere to deny our adversaries the power to wreak havoc on our supply chains.

Dr. Scissors, Taiwan is one of the world's leading manufacturers of semi-conductors. To what degree is China's drive to control the semi-conductor industry motivated by a desire to isolate Taiwan

and how can the United States and its allies best protect Taiwan from China's economic bullying?

Dr. SCISSORS. Oh, that is a tough question, you know, because there are multiple angles to look at this. I think all of us who follow this issue, simultaneously feel a desire to be good partners to the Taiwanese semi-conductor industry because it is so important to the Taiwanese economy and want to encourage the democracy on Taiwan who is under threat by cult of personality leadership, but at the same time, TSMC has a lot of sales in China.

It is—you know, it can be coerced, to some extent, by the Chinese Government. And I would not be comfortable, for example, if—somebody said earlier, there are a list of new plants that are planned for the United States. Might have been Representative Keating or Representative Fitzpatrick, but I would not be comfortable with the only a giant TSMC plant.

So we have to balance two things, which is, we have to help Taiwan, include them absolutely as one of our partners in high-value supply chains, but also not be too dependent on Taiwanese supply. Because whether we like it or not, Taiwan is very tightly implicated economically with China and that is not going to end any time soon. I am not sure I got to your question, so—

Mrs. WAGNER. Let me ask you this—

Mr. SCISSORS [continuing]. Sorry about that.

Mrs. WAGNER. Well, let me ask you, Dr. Scissors, can you provide an overview of the PRC's policy designed to maintain dominance of the rare earth industry? You know, what are the ultimate aims of China's new export control law and how can the United States proactively mitigate its impacts?

Dr. SCISSORS. So the Chinese have learned from their own dependence on oil, some foreign agricultural products, iron ore that when they have the opportunity to control the raw material, they want to. And so they have set up sort of a rare earth OPEC within China. Used to be a lot of independent distributors and manufacturers, and now they are all controlled by essentially State-owned enterprises.

So the Chinese have centralized the rare earth production process. And what they are trying to do is to be able to not necessarily even, you know, ban exports, but to threaten to ban exports to make clear to everyone that if you want a reliable supply of rare earths, you need to base your facility in China whatever you are making.

And as you know very well, ma'am, that extends to a large range of products.

Mrs. WAGNER. Yep.

Dr. SCISSORS. So they are not necessarily looking to try to force people to respond to a supply cutoff because then people start looking for recycling and their own production. What they want to do is to tell firms the best place to get your rare earths for sure, cooperate with us. That is the message.

Mrs. WAGNER. And I think that that is the ultimate aim of their new export control law.

Switching topics here in my brief time. Europe is suffering a serious energy shortages due in large part to Russia's efforts to constrict supply and destabilize markets as it foments a crisis here in

Ukrainian. Europe's dependence on Russia for energy may cause much human suffering this winter and could become a serious vulnerability for NATO members.

It is clear that Nord Stream 2, a Russian, as we know, influenced project that the Biden Administration allowed to move forward by removing sanctions will only exacerbate Europe's dependence on Russian energy. There is probably not time, but Dr. Shih, I would love to get your perspective on what role can the United States play in securing Europe's energy supply?

Mr. KEATING. Dr. Shih, briefly, since time is expired, if you could answer that.

Dr. SHIH. OK. Well, we are a large producer of natural gas as well. I think, you know, the other thing is, we should be talking with them very carefully about, you know—and this is—something that has just come to the floor is like this decarbonization and this energy transition is going to cause dislocations in many sectors. And I think that is absence of planning.

Mrs. WAGNER. I thank you.

And I yield back.

Mr. KEATING. Thank you.

Mrs. WAGNER. I appreciate the chair's indulgent.

And I yield back.

Mr. KEATING. The chair recognizes Representative Susan Wild for 5 minutes.

Representative Wild, are you there?

We will go on to see if Representative Deutch—I know some people are in and out—recognized for 5 minutes.

Same with Cicilline. 5 minutes. I know some are coming back.

I know Representative Titus is there, I can see you. You are recognized for 5 minutes.

I think we are frozen here now. Are we back in?

Mr. MAST. I can hear you, Chairman Keating. Brian Mast. I can hear you fine.

Mr. KEATING. The chair recognizes Representative Titus for 5 minutes.

Representative TITUS. She cannot hear me either.

We are having a little technological difficulty.

I can see Representative Titus.

All right. I am going to go to Representative Schneider for 5 minutes. I see you just sitting down, Representative.

So are we having some difficulty? I know Representative Mast—

Mr. SCHNEIDER. No. Sorry, Mr. Chairman. I just stepped away.

Mr. KEATING. OK. You are recognized for 5 minutes.

And while we are doing that, staff can touch base with Representative Titus, perhaps her staff and see what is going on there.

You are recognized, Representative Schneider, for 5 minutes.

Mr. SCHNEIDER. Thank you. I want to thank you for calling this hearing and our witnesses for sharing their perspectives today.

And, Professor Shih, if I may start with you. You know, reading your bio, I come from a similar vintage. I was an industrial engineer, graduated 1983. And in preparing for the hearing, I was struck—I was doing some research. I came across a New York Times article by David Sanger—I think he might still be there—

talking about critical shortage in semiconductors. The only thing that was easing, after a year of scarcity forced by many makers of computers, video cassette recorders and other electronic products to reduce their production. That was 1984, and it was talking about E prongs and 64K memory chips, a very different time.

In your remarks and answer, you talked about many of the advances made but also an emphasis of shifting technologies. I know we have made so much advance, especially under Moore's law with the doubling of capacities, getting to extremely tight tolerances, but we need to look at other areas.

So I was hoping you might expand a little bit more about the continuous process manufacturing, how that differs from batch manufacturing and how it is potentially a pathway for us to both address supply chain but also the dependencies on foreign countries and improve our strategic position, as well as what might be some of the barriers to achieving it long term.

Dr. SHIH. OK. So let me talk about continuous manufacturing in chemicals. OK.

Mr. SCHNEIDER. Right.

Dr. SHIH. 75 percent plus of fine chemicals come from China. OK. It was a sector they identified as very important. All right. So there was a lot of subsidies into small companies who would make these fine chemicals. And as we know, fine chemicals go to a lot more than just pharmaceutical ingredients. They go into many, many different things.

When you think about a typical batch reactor, that may be 50 liters. It may be 500 liters. Sometimes it may be larger than that. And, you know, usually it is like a stainless steel or a titanium vessel, and you mix chemicals in there. And you make things a batch at a time. And, hey, I will have a tank truckload of methylene chloride that I will use for—and I will go and do all of these things batch-wise.

Now, there is a cost to doing things in those scales, all right, because you have to also process the waste and you have to purify them and stuff like that.

The continuous flow manufacturing—and there is a company that I visited in Boston. I mentioned it, Snapdragon Chemistry, came out of MIT, and this was work originally funded by DARPA. And the idea was, you know, loosely I want to take earth, fire, water, and air in one end, and I want to be able to make battlefield medicine. So it was the DARPA Battlefield Medicine Initiative, but the idea was could I put inside, like, a shipping container a factory that could make chemicals on demand.

Now, in the continuous flow model, what I am doing is I am talking about very small reactors that are—because they do not have a lot of chemicals—they do not enclose a lot of volume, and usually I am flowing them. Then I can do a lot of things that I cannot do in a batch reactor. I can handle explosive reactions because I have very small volumes or I do not have to worry about mixing or I can put sensors on all of this stuff for monitoring the inputs and outputs and improve my yields.

OK. So it is a new way. It is a—you know, a lot of companies are interested in adopting it, but what it does is it obsoletes all of that existing infrastructure that people already have, and it be-

comes much more scale efficient. It is much more kind of IT intensive, things that play to American strengths.

So I have been advocating we should think that way, you know, on some of these kind of technology transitions; the same with chip packaging, all right, which I think is a technology transition. We can be smart about it, and it is, like, let's grab the lead doing stuff that the U.S. has always been good at, which is leading in science, leading edge thinking, if you will, taking those risks.

I mean, we saw what Operation Warp speed did in terms of mRNA vaccines in terms of accelerating something that had never been an approved drug before. OK.

And so the way I think about it is, like, in semiconductors, advanced packaging, you know, Pharma APIs, continuous flow manufacturing, think process changes like that.

Mr. SCHNEIDER. So taking that a step further—and I can open this up to everyone—you mentioned Operation Warp Speed which did accelerate bringing the vaccines to the market. You mentioned DARPA. There are ways governments can remove barriers, remove obstacles. There are ways governments can change the slope to accelerate progress. We are not the ones who are necessarily inventing it, certainly not the people on this panel.

What things can we do to help expand our capabilities, expand our capacities, open the doors so that U.S. industries are leading the ways on new technologies, new capabilities?

Dr. SHIH. Yes. And recognizing time, I'll be very brief here. Let's talk about Operation Warp Speed and mRNA vaccines. Everybody thinks that was a 1-year miracle or a 2-year miracle. mRNA vaccines were first proposed in 1990, and it was because the U.S. invested so much in genomics, the human genome program, biotechnology, you name it, life sciences broadly over the period of the 1990's to 2000's, you know, DARPA did a project with Moderna on mRNA vaccines and pandemic preparedness in, I think it was 2013, 2014. But it was that long-term investment in the basic science, the leadership there. That is what this country is good at. Right.

So I think if we invest in that kind of leadership R&D, foster this marketplace of competing ideas—that is what you do not see in China, by the way. You know, fostering all of these competing ideas, that is what we are good at. That is how we lead.

Mr. SCHNEIDER. Thank you. I know I am out of time. I do not know if there is time for the other witnesses to weigh in. But, if not, I yield back my time and, again, thank the chair.

Mr. KEATING. Thank you, Representative.

The chair recognizes Representative Mast for 5 minutes.

Mr. MAST. Thank you, Mr. Chairman. Drs. Scissors, Shih, Bown, I appreciate your testimonies today.

I just want to start with a question surrounding the LNG conversation, the gap in Europe. We can talk about what is going on in Asia as well. This is just an opinion question for each of you. Do doctors consider LNG clean or dirty energy?

Dr. SCISSORS. I consider it clean. I do not—we could go into detail about that, but short answer, I consider it clean.

Dr. SHIH. I consider it cleaner and a critical transition fuel.

Dr. BOWN. Same, cleaner.

Mr. MAST. Cleaner. All right. Fair enough. I appreciate you giving me an answer.

Dr. Scissors, I guess I would ask, or Shih or Bown after that, do you think there is anything that we in the U.S. should be learning from that, that gap that we are filling for Europe right now as it relates to LNG? I have watched the numbers over the months, you know, of our exports. It has gone from 20, 30, 40, over 50 percent I believe at one point of our exports going to fill that gap for LNG over in Europe.

You know, opinion, love to see us taking work away from Russia, but is there something that you all think that we should be learning from that?

Is there a point that we hit a wall that we cannot fill that gap?

And do we consider that to be sustainable to continue to fill that gap for them?

Dr. SCISSORS. I will go quickly first because I know you want to hear from all of us.

I think the LNG, the gas crisis in Europe falls under the category that I was mentioning right at the beginning, which is when we think of crisis preparedness in the United States, we should not just think about what we are producing for ourselves. We should be thinking about what we are producing, if we can, for our key allies.

So I criticized the Biden Administration right from the beginning saying, Look, you know, go slow on this whole we do not like fossil fuel production thing, because the world isn't moving at the same speed we are. And it would be helpful right now if the U.S. had whatever our maximal gas production capacity was so that we could help our friends when they are in trouble, so that we could serve our geopolitical aims to reduce Russian influence in this case.

So my general point here is I do not think we are maximized at our energy production. You do not want to necessarily maximize your energy production at all times, but you do when one of your close allies, as Europe is, is in jeopardy. And I would like us to think about crisis preparedness not just for ourselves but for our friends, and I think that would put us in a better position with regard to energy supplies to Europe or to Asia which, as we know, East Asia is extremely dependent on the Middle East.

Mr. MAST. Dr. Bown?

Dr. BOWN. I guess I would say LNG is—it is only recently that we have been able to export LNG, and there is a difference between production and export. Export requires massive investments, you know, in these terminals to be able to sell it. And so this is not something you are going to be able to ramp up on scale relatively quickly.

And piggybacking on that, you know, this was a huge priority with the Trump Administration as part of the phase 1 agreement with China. China is supposed to be buying all of our LNG exports in order to meet the phase 1 commitments. So, you know, you kind of cannot have both, saying they have to reach \$200 billion of American exports and say that you want to divert LNG exports to Europe to help deal with the challenges there. Right. So some of this is part of the inherited mess from the Trump Administration.

Mr. MAST. If I could pause you, Dr. Bown.

How much of that do you think is from us approving permits for those plants—not us, but, you know, how much do you think of that is in red tape? Could that be ramped up quicker?

Dr. BOWN. My understanding of this industry—and I am not a huge expert, but it requires—the capital investments necessarily for the terminals is a separate endeavor that typically requires long-term relationships between, you know, American suppliers and foreign buyers to make it worthwhile for them to undertake the investment, you know—

Mr. MAST. They are not going to know the buyers so they are not going to start sucking it out of a Russian pipeline right away?

Dr. BOWN. No, it is not quick.

Mr. MAST. Dr. Shih, anything you care to add? We have got about 40 seconds remaining.

Dr. SHIH. Yes. I would just add, you know, one of the things I think we should have learned is we need to do more planning around the energy transition, all right, because, you know, we are going to see that in, you know, the grid going from centralized generation to distributed generation and distributed consumption. Right.

So there are other areas. I mean, to me it is a warning call that we need to think about the other implications of this energy transition which we are moving down.

Mr. MAST. I appreciate the testimonies from everybody today.

Thank you, Mr. Chairman. Yield back.

Mr. KEATING. Thank you, Representative.

The chair recognizes Representative Costa for 5 minutes.

Representative Costa?

We are having people come in and out I know because of other issues.

Mr. COSTA. Can you hear me now?

Mr. KEATING. I can. Representative Costa, you are recognized for 5 minutes.

Mr. COSTA. Thank you very much, Mr. Chairman, for holding this important subcommittee hearing, and I am multitasking. I have got a markup in Natural Resources going on concurrently.

But, Dr. Bown, I work very closely with the chairman here with our European allies, and I chair the Transatlantic Legislators Dialogue and in our parliamentary group that you may be familiar with, the US-EU. Do you see any potential for cooperation that does not already exist between ourselves and the European Union on critical supply chains?

And what topics do you believe that we should prioritize for Transatlantic cooperation to improve supply chain resiliency, particularly in reducing our dependence on China?

Dr. BOWN. So some of it is already happening, and I think it is being facilitated by not only the work that you are doing but by the TTC. Right. So I think one aspect is on export controls. You know, this is sort of a new competency in the European Commission, and it is important to get them aligned with what we want to be doing on export controls because we produce, manufacturers, so many of the same things that if they are not willing to put controls on exports, our willingness to do so could go for naught and not end up protecting national security. So they need to be on the same page.

In other areas I think it is, you know, important to have the chains—the channels of communication open. So the example that I gave about vaccines, you know, was hopefully unique, we never see something like that again. But the shortages that arose meant that—and arose essentially because American policymakers didn't have visibility into the European supply chains.

So we needed communication between essentially, at that point, the White House coordinator on COVID response with the Brussels coordinator on COVID, and they eventually got there. But I think having a TTC up and running in place could help facilitate those connections earlier so that when problems do arise, we can tackle them, whether it is on, you know, vaccines or semiconductor shortages, things like that.

My sense is that hopefully we will see better integration and policy in the future.

Mr. COSTA. You are basically saying closer cooperation between the EU and ourselves on a host of these supply chain issues are critical to both ourselves and our allies.

Dr. BOWN. Yes. Recognizing that when a challenge happens, that someone across the Atlantic may be able to help us as opposed to being your nemesis. Right. I think it is sort of a change in mindset, that we can rely on each other and we need to be benefiting from diversification.

Mr. COSTA. No. And I have reminded folks our European friends are our allies, not our adversaries.

Dr. BOWN. Exactly.

Mr. COSTA. And thanks for giving context on Warp Speed because, while it was successful, clearly a lot of work had been done over the last 20 years.

Dr. Shih, what should be our focus during the Trade and Technology Council sessions during the 2022 Spring Forum?

And can we ensure that concrete actions and policy solutions emerge from the forum?

Dr. SHIH. Well, I think—as Dr. Bown said, I think alignment on kind of some of the strategies around supply chains, I think especially around export controls, as he pointed out, you know, if we impose controls and, you know, other countries go to the Europeans, that—you know, we end up shooting ourselves in the foot.

A good example of that is what happened with GPS when we controlled that. That spawned an European effort, as well as a Chinese and a Russian and now U.K. effort.

I think the other thing is, like, we need to have a pretty candid discussion with them about a lot of these issues, you know, and we need to understand what it takes to be a reliable supplier to them too. I think their perception is not that we are a reliable supplier. And if you are not a reliable supplier, then they are going to look for alternatives. Right. True allies will share the pain when we have a natural gas crisis, even though there may be domestic cost to that.

Mr. COSTA. I think that is a good point.

Mr. KEATING. Representative Costa, if I could suspend for 2 seconds.

Someone is not on mute in the background. I just ask someone to check to see that you are on mute.

The chair recognizes Representative Costa.

Mr. COSTA. All right. I will be quick here.

I do not know which of the three of you might want to offer whether or not we can grow our rare earth industry in the United States and how we can work with our allies to solve problems with the rare earth supply chain.

Dr. SHIH. Let me offer, we have good deposits in Wyoming. OK. We do not have the processing infrastructure. Lynas, the Australian firm, is building a processing plant in Texas. OK. Having stable demand for domestic suppliers is a good way to do that, and that might—in this case it would make a lot of sense to purchase for a stockpile.

Mr. COSTA. Thank you.

Thank you, Mr. Chairman.

Mr. KEATING. Thank you, Representative.

The chair recognizes Representative Meuser for 5 minutes.

Mr. MEUSER. Thank you, Chairman. Thank you to our witnesses very much.

Dr. Scissors, would you say that in 2019 the U.S. economy on a comparative basis to the rest of the world that we traded with was doing well?

Dr. SCISSORS. Wow, put me on the spot there, sir.

I would say, yes, it was. But I also see the seeds for problems because we were borrowing too much money. That is my own personal opinion.

Mr. MEUSER. Fair. Our deficit did increase that year by \$520 billion. Of course, over the last couple of years, we have—you know, we have had COVID. But, I mean, we are up \$6 trillion, I believe it is, so a little bit more.

In 2018, our GDP was \$20 trillion. Our China trade deficit was \$419. In 2019, our GDP was \$21 trillion. Our China trade deficit was \$319. In 2020, the year of COVID, we went down to \$19 trillion in GDP, \$310 China trade deficit. And in 2021, we had an absolutely booming year, \$23 trillion, with \$344 trade deficit.

So what is interesting there is that the size of the increase, \$4 trillion, nearly 20 percent, but also the fact that here we are thinking that we are buying everything necessarily from China, and it went up relatively proportionately. Of course, you have got inflation in that GDP number and a tremendous amount of government spending.

So we know where we are with outcomes. You know, I was in the real world in business for 25 years, and there you focus on outcomes, not intentions.

So, you know, what we have right here is we have enormous demand in certain sectors. I am not telling anybody anything they do not know. Consumer spending is very high. We have incredible work force shortages in rural areas and throughout cities. It exists. All you have got to do is take a walk with me down Main Street, and you will hear every single business tell you that.

Now, in China, they had their shutdowns as well, and that is primarily the reason that we have got, you know, so many cargo ships offshore. But our domestic production clearly was dramatically reduced, from furniture to bacon, and, you know, that is why we have the type of inflation we haven't seen since 1982.

So why would you think that this Administration would think it is a good idea—because to me it is the worst time—to increase government spending? And this is for Dr. Shih as well and perhaps the other witness. I mean, worst time to increase taxes, worst time to put down certain mandates on employment availability, all right, without doing it in a smart way, particularly without doing any stockpiling of testing. Here you have this huge test mandate, and you do not—or you discuss it anyway. It gets proven unconstitutional, and then you do not even bother worrying about the supply.

And so my question to you is, do you think the continued idea to continue to spend and increase taxes is the right way to go in this sort of environment?

Dr. SCISSORS. No, I definitely do not. I understand why people have a response to the crisis that they think in the short term what we need to do time now, this is urgent. I get that. And we can have an argument over short-term policy. But on long-term policy, I think we are in complete agreement, sir.

I would say as somebody who thinks about U.S. economic competition versus China, you do not want to win the debt race. You do not want to be first in debt. As we had discussed repeatedly in this hearing, you do want to be first in innovation. And innovation does not solve all of your problems, but if you want to win an economic competition and be healthy economically, you need to innovate.

And, finally, as you mentioned, we need to train our workers. We have a lot of people—there are, you know, thoughts that people do not want to work anymore. Let's give them the skill level to get a job that they like better than the one they have or the one they do not want to apply to.

Mr. MEUSER. I agree. It is hard with a \$50,000 annual cost for college, 50,000 plus—and I would love to get the witnesses thoughts on the CHIPS Act because I certainly believe it is imperative, important, and necessary, so maybe we could get that in a followup.

But I yield back, Mr. Chairman. I understand my time has run out.

Mr. KEATING. Thank you, Representative.

The chair recognizes Representative Tenney for 5 minutes.

Ms. TENNEY. Thank you, Mr. Chairman and Ranking Member. Thanks to the witnesses, really interesting discussion.

I am going to direct my first question to Dr. Scissors or Dr. Scissors. In 2020, the Chinese Communist Party signed the 15-nation Regional Comprehensive Economic Partnership and included some of our close allies, like Japan and South Korea, who are already parties to that. What do you think this will mean for the EU, Britain, and the U.S. as we seek to create supply chain resiliency against the Chinese Communist Party?

That is my first question. I have got a quick second one coming on that.

Dr. SCISSORS. Well, I do not think RCEP itself, the substance of it matters very much. It is not a liberalizing, you know, dynamic agreement. I think what matters in RCEP is the question of U.S. commitment. As I mentioned earlier, and others have mentioned

during the conversation, if you want to cooperate with Europe, you need to be a reliable partner in your regulatory action, in your supply. And if the U.S.—the U.S. does not have to respond to RCEP, but if the U.S. says, Look, we really cannot make international agreements, it is too hard, there's too much bipartisan bickering, that really hurts our cooperation here.

So I do not think RCEP puts us in a difficult way itself in supply chains. Where we put ourselves in a difficult position is we are not out there saying, We want to work with our partners. We are willing to pay some price to do that. We are going to stick to policies. We have agreement.

And that's—I'll be—to wrap up quickly, I think the TTC and congressional guidance to the TTC is an area where we could have bipartisan cooperation. That would be really important. That would be a really important signal, not just to Europe, but to our allies in East Asia.

Ms. TENNEY. OK. So I see your recommendation for the Biden Administration is not too worry about this too much at this point?

Dr. SCISSORS. Not to worry too much about RCEP. RCEP is a diplomatic agreement, but it is to care about U.S. credibility that we will engage on economic issues and stick to our word.

Ms. TENNEY. So let me just say, the EU has been pursuing a digital sovereignty agenda that targets U.S. firms for discriminatory treatment, which in some ways is similar to what China often does. These EU policies are antithetical to Transatlantic cooperation—I realize that was a diplomatic one—on critical supply chains in security and other areas. If the EU is unwilling to treat the United States as a trusted partner, especially referring to those agreements, in the case of cloud services in this case, why should the United States treat the EU as a trusted partner when it comes to semiconductors, pharmaceuticals, and others that we are dealing with them on?

Dr. SCISSORS. Very quickly, I think you raise a really important point. We are being—you know, we do not have all the time in the world. We are being very facile in saying, OK, the U.S. and the EU should cooperate more. But there are problems in the U.S. and EU relationship that we are going to have to overcome. I guess what I hope the EU will do—I certainly hope we will do—is remember that our differences with the EU pale in comparison to our differences with China. So we have to be prepared to say, you are doing something we do not like. We will put up with that one, not this one. We will put up with A, not with B. And they have to be prepared to do the same thing.

And we may find out Europe cannot do this. The EU is not a single actor as we know. It takes them a long time to come to an agreement, even when some of the partners agree with us. But I think we should try because our problems with Europe, while they exist and they are important, they are much less than our problems with China.

Ms. TENNEY. Right. So in terms of technological sovereignty for these products, shouldn't we be a little less reliant on EU and, you know, maybe chart our own course? Because we are going to have to be—have some, you know, preventative resiliency against China,

even with EU not as much a partner as we would like them to be or at least not as trusted as we think they can be.

How would you react to that?

Dr. SCISSORS. Well, I think we should try to talk to our friends, Europe, our USMCA partners, Japan, Australia, Philippines, this is a treaty ally. When they won't go along, we are going to have to be self-reliant. So we are going to have to be prepared to be self-reliant. We should try to get our friends on board, but we have to have a backup plan.

Ms. TENNEY. Thank you.

So, Dr. Shih, I do not know, I have 55 seconds left. What specific suggestions for the US-EU Trade and Technology Council, which had its first meeting in September of last year, do you have beyond just the Statements we have seen?

Specifically what actions would you like to see come out of these talks upcoming?

You have got 40 seconds. Thank you.

Dr. SHIH. I would like to see the discussion on kind of our strategic interest and how, as Dr. Scissors has pointed out, we actually have a lot in common. There are issues, obviously, on some of the technology companies, and I think that is the essence of a negotiation and horse trading. OK.

But I think right now many of the countries I talk to over there are very worried about the U.S. in terms of what they view as perhaps, you know, a somewhat cavalier approach on sanctions, and so on. All right. So I think it is a hard negotiation. It is going to take time.

Ms. TENNEY. Thank you.

I yield back.

Mr. KEATING. Thank you, Representative.

Just briefly to go through some followup second round issues that I know that members that were called away wanted to address. And one is what Dr. Shih has spoken about with research and the importance of that research.

We know from the defense side our government is investing in many research areas, but also with other governmental efforts, including the Infrastructure Bill that was passed or Build Back Better which is in the Senate.

How important for us competitively is it to keep investing as a country in research?

Dr. Shih?

Dr. SHIH. I think it is foremost. That is what we are good at. That is—as we see, those are the things that lead to down the road, you know, whole industries. And the example I always use is, you know, biotech, life sciences, what we did in the eighties and nineties. And we are just scratching the surface on all the good things that are going to come out of that that are world leading. Right. If you look at all of the global Pharma companies who have decided they have to be in the U.S. because of that. OK. And that has happened before. Right. We saw it in semiconductors in the 1960's, OK, with investments primarily by NASA and the Defense Department in semiconductors. In the sixties NASA and DOD consumed 60 percent of all of that. We have seen that in aerospace. Especially, I am a huge fan of what NASA has done in terms of,

you know, technology programs, winglets, super critical wings, high compression ratios, you know, energy efficient engine program is a remarkable success, or what they have done with commercial crew. Right.

And so what you see is that kind of investing of the forefront, investing in, you know, having the competition of ideas, OK, having lots of different players come up with their ideas. Not all of them succeed. That is what this country is good at.

Having said all of that, one of the other things I tell people that I think is very important is we have to work on the demand side as well, OK, because, you know, too many technologies we have seen get developed in the U.S. and they get commercialized off-shore because we no longer have, you know, the manufacturing infrastructure or the products that those go into. I have been associated with companies that end up being sold off to Asian competitors because we do not have that. Right.

So working on the demand side I think is also an important part of that.

Mr. KEATING. Yeah, the other broad issue that we really haven't touched on, to any great extent, really is the timeframe that is out of our control and exigent, and that is the whole issue of climate change. When I was at the Summit in Glasgow, the private sector came forward with a commitment to \$131 trillion of investment.

And as we go forward, how can we be sure the U.S. is positioned to take advantage economically of this massive investment that is going into climate change?

Dr. SHIH. So let me give you a few examples there. OK. Because one of the main trends that you are seeing, of course, is electrification, not only in transportation but also grid monitorization, distributed generation, and stuff like that. OK. Knowing that that is coming and the U.S. is still a leader in, for example, group III-IV semiconductors. If you want to build 800 watt car chargers, you know, fast chargers, you are going to need silicon carbide and gallium nitride group III-V semiconductors, right, but understanding where these things are going and then investing in the forefront technologies. OK.

And actually the opportunity for the U.S. in grid monitorization with the Infrastructure Bill is that we will have demand for some of those things, right, so that we can pull them through, and then we can actually make businesses that are successful producing those in the U.S.

So I think it is actually an opportunity. But, you know, we really need to be well-informed on some of the challenges associated with that because, you know, like—and the Europeans have seen this a lot in terms of the electrification and distributed generation and power storage, and stuff like that. They have encountered a lot of problems. China has encountered a lot of problems.

I was reading a paper on high voltage DC and net oscillation because of, you know, using a lot of power semiconductors connecting all of those wind turbines and solar farms, and stuff like that.

So there is a lot of opportunity, but we really need to understand those issues and recognize them as opportunities.

Mr. KEATING. OK. Does anyone else want to touch base on that?

Dr. SCISSORS. Could I make a 30-second comment on that, Mr. Chairman?

I agree completely with the emphasis here on innovation. It is absolutely vital for competitiveness. And I do not want to cast the slightest aspersion on it. I do not think it is sufficient. And I will give an example on climate change. The Chinese did not come up with the breakthrough solar panel technology originally. I am not saying they are not competitive in solar panel technology now, but originally they didn't. And, yet, they subsidized and drove everybody out of business, and they have an absolutely dominant position in solar panels.

So when you are ahead of a competitor in terms of innovation, fine. You do not have so worry about them barging in on your market. But in areas where the U.S. cannot stay ahead—and we will not be able to stay ahead in everything—we do have to consider that secondary point of we are going to have nonmarket economies or interventionist economies harm our demand. Europe had a ton of demand for solar, but it wasn't enough to keep the Chinese out, even though the Chinese at the time were not the most innovative.

So innovation is the first step for sure. I just want to be cautious that we are not going to be ahead in every area, which means there are other factors we have to consider.

Mr. KEATING. Dr. Bown, any comments on that?

Dr. BOWN. So related to this, and it will tie in with climate, is I think going back to Operation Warp Speed and drawing the lessons from that. And while I do not disagree with the way it has been characterized, I would like for us to take a little bit of a step back and remember that we actually subsidized six different vaccines at the beginning. Three of them didn't work out. One of them worked out, so this is the J&J, but then we had massive production problems. All of this is to say that is incredibly natural. We need to diversify.

So anytime we are thinking about industrial policy or intervening in areas, we have to think about being diversified. We have to be willing to accept some failure because that is part and parcel of how innovative sectors work.

And then we need to have an exit strategy when we see the failures are happening so that we do not, you know, pile good money after—or bad money after good, or whatever the expression is.

So I think there is a full range of lessons that we can take from the experience of Operation Warp Speed to apply to other areas in the future.

Mr. KEATING. Last, Representative Titus, who was on for most of this hearing, has asked me to bring forth one other issue, if you could, for the record. And that is one that we are all familiar with. I mentioned it briefly in my opening remarks, hoping to get to it. But that is part of the distribution problems that we have as well.

Representative Titus has a great concern on ports and the issues that, you know, hurt us in terms of transportation, backlogs and jams in the distribution network of our supply chains.

Would anyone want to comment on that issue?

Dr. BOWN. Let me say two things related to the distribution and kind of equity issues here.

One is to remind everybody that much of the explanation for the massive supply chain disruptions that we are seeing is a demand-side phenomenon. We are not back to a normal world where people are consuming the normal amount of services that they would normally consume. They do not go to restaurants. They do not go to spas. They do not go on vacation as much.

And what that means is they have taken their budgets and they are spending it on goods. And a lot of those goods are traded. They come through the ports. They come through the transportation system. And that is why the supply chain logistics network has been overstressed. Some of that will go away with time. Some of that is pandemic related.

Finally, one other one on distribution, so Professor Shih rightly characterized new technologies in the semiconductor industry as potentially allowing us to bring back this offshore assembly and test this last stage of the semiconductor manufacturing process. But we should keep in mind that it is incredibly automated new technologies. And so if we are thinking that manufacturing of semiconductors is a jobs plan, we have to keep that in mind. We are not talking about jobs here. And the jobs that are going to be there are probably really high-end jobs.

So there is—this is national security. I understand it. It is resilience. I understand it. But this could in and of itself feed into additional inequities in our system that need to be addressed elsewhere.

Mr. KEATING. Yes, I think the EU clearly has integrated that into their decisionmaking on these areas as ultimately we have too.

I noticed that Dr. Shih wanted to comment on that.

Dr. SHIH. I was just going to reinforce what Dr. Bown said, about it has really been a demand surge. If you talk to people in the logistics industry, container lines, and so on, they will point to the eastbound Trans-Pacific as being the thing that has upset all of the logistics networks. There is so much demand on that trade lane, it is sucking capacity out of, for example, out of the Westbound Transatlantic trade lanes and some of the other trade lanes.

And the other thing to remember is that as you get congestion, as you get 100 new ships anchored offshore, as they—you know, if you looked—I checked Port of Long Beach yesterday. There are some ships unloading there that had left their ports in Asia in November. OK. And they are just unloading now.

What that does is it removes a huge amount of capacity from the system. And so now the congestion, when we have all of the containers piled up, it is very hard to move stuff through the yards onto intermodal, onto trucking, especially when you are facing labor shortages. With the congestion, you get more delays with congestion, and that is what we are seeing right now.

Mr. KEATING. Yes. And we are seeing how fragile the supply chain is too because just the lack of a universal platform on the trucks when the containers are being, you know, loaded, that is created jams, as well as some of the unforeseen, I think, resignations in certain areas of people moving away, where they were able to make money as a truck driver, they are being paid on the number of deliveries. Now that is cut in half. And a lot of them are getting out of the business as a result.

So it is a fragile network we have. I think the fact that some of the things we import come from countries where they are still not digitalizing, -digitizing rather the cargos, they are still doing it in hand, and they cause delays in that respect.

So there is things we will learn from this going forward, but I think the three of you have clearly raised a lot of issues that still remain to be dealt with.

I really appreciate your participation because I think we looked at this issue from so many different perspectives and, in many respects, just scratched the surface of what we are doing, and that is something that probably we anticipated. But I appreciate your input. We will look forward to your entire testimony being part of the record, and some members may have questions in writing as we go forward.

So the members will have 5 days to submit statements, extraneous materials, and questions for the record, subject to the limitations on the rules.

And, again, I want to thank all of you for your participation. This is an issue that will be ongoing and one that is critical, not just to the U.S. economy, but globally to the economies that we face.

So, again, thank you for your time.

This hearing is adjourned.

Thank you.

[Whereupon, at 3:51 p.m., the subcommittee was adjourned.]

APPENDIX

**SUBCOMMITTEE HEARING NOTICE
COMMITTEE ON FOREIGN AFFAIRS
U.S. HOUSE OF REPRESENTATIVES
WASHINGTON, DC 20515-6128**

Subcommittee on Europe, Energy, the Environment, and Cyber

William R. Keating (D-MA), Chair

January 19, 2022

TO: MEMBERS OF THE COMMITTEE ON FOREIGN AFFAIRS

You are respectfully requested to attend an OPEN hearing of the Committee on Foreign Affairs, to be held by the Subcommittee on Europe, Energy, the Environment, and Cyber via Cisco WebEx (and available by live webcast on the Committee website at <https://foreignaffairs.house.gov/>):

DATE: Wednesday, January 19, 2022

TIME: 2:00 p.m., EST

SUBJECT: Transatlantic Cooperation on Critical Supply Chain Security

WITNESS: Willy C. Shih, Ph.D.
Robert & Jane Cizik Professor of Management Practice in Business
Administration
Harvard Business School

Chad P. Bown, Ph.D.
Reginald Jones Senior Fellow
Peterson Institute for International Economics

Derek Scissors, Ph.D.
Senior Fellow
American Enterprise Institute

By Direction of the Chair

To fill out this form online: Either use the tab key to travel through each field or mouse click each line or within blue box. Type in information.

COMMITTEE ON FOREIGN AFFAIRS

Note: Red boxes with red type will NOT print.

MINUTES OF SUBCOMMITTEE ON Europe, Energy, the Environment, and Cyber HEARING

Day Wednesday Date 01/19/2022 Room Cisco Webex

Starting Time 2:08pm Ending Time 3:51pm

Recesses (___ to ___) (___ to ___)

Presiding Member(s)
William R. Keating

Check all of the following that apply:

Open Session Electronically Recorded (taped)
Executive (closed) Session Stenographic Record
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To select a box, mouse click it, or tab to it and use the enter key to select. Another click on the same box will deselect it.

TITLE OF HEARING:
Transatlantic Cooperation on Critical Supply Chain Security

SUBCOMMITTEE MEMBERS PRESENT:
See Attached

NON-SUBCOMMITTEE MEMBERS PRESENT: (Mark with an * if they are not members of full committee.)

HEARING WITNESSES: Same as meeting notice attached? Yes No
(If "no", please list below and include title, agency, department, or organization.)

STATEMENTS FOR THE RECORD: (List any statements submitted for the record.)

Dr. Willy C. Shih's Testimony
Dr. Willy C. Shih's Related Witness Support Document #1
Dr. Chad P. Bown's Testimony
Dr. Derek Scissors Testimony
Representative William R. Keating's Addition to the Record on behalf of Dr. Derek Scissors
Representative Dina Titus' QFR for Dr. Chad P. Bown
Representative Dina Titus' QFR for Dr. Willy C. Shih

TIME SCHEDULED TO RECONVENE _____
or
TIME ADJOURNED 3:51pm

Benjamin Cooper
Subcommittee Staff Associate

Clear Form

Note: If listing additional witnesses not included on hearing notice, be sure to include title, agency, etc.

WHEN COMPLETED: Please print for subcommittee staff director's signature and make at least one copy of the signed form. A signed copy is to be included with the hearing/markup transcript when ready for printing along with a copy of the final meeting notice (both will go into the appendix). The signed original, with a copy of the final meeting notice attached, goes to full committee. An electronic copy of this PDF file may be saved to your hearing folder, if desired.

HOUSE COMMITTEE ON FOREIGN AFFAIRS
EUROPE, ENERGY, THE ENVIRONMENT, AND CYBER SUBCOMMITTEE HEARING

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RESPONSES TO QUESTIONS SUBMITTED FOR THE RECORD

Questions for the Record Submitted to Dr. Chad P. Bown
Rep. Dina Titus (NV-01)
Europe, Energy, the Environment, and Cyber Subcommittee
Wednesday, January 19, 2022

Question 1:

While the State of Nevada and Las Vegas are known for producing lots of fun, we are not known for producing much else and rely heavily on imports of critical goods, from fresh flowers to lobsters, to maintain our economy. Our U.S. port system has unfortunately been overtaxed for quite some time and the effects of the pandemic only exacerbated the issues plaguing our ports and the ability to effectively import goods into the U.S. What do you see as the greatest cause of port congestion in the United States and what policies do you think Congress should be implementing to alleviate this pressure at our ports?

Answer 1:

Dr. Bown did not submit a response in time for printing.

Question 2:

As was mentioned in the hearing, the U.S. and the EU still lack a common diversification strategy and a shared approach to responding to a crisis. Outside of the TTC, how can the U.S. and EU outline a common approach to diversification and a strategy that recognizes their international investment priorities to establish resilient supply chains?

Answer 2:

Dr. Bown did not submit a response in time for printing.

Questions for the Record Submitted to Dr. Willy C. Shih
Rep. Dina Titus (NV-01)
Europe, Energy, the Environment, and Cyber Subcommittee
Wednesday, January 19, 2022

Question 1:

In your testimony you noted that “one of the benefits of global supply chains is that producers can develop scale efficiencies and leverage cost advantages of being in one location or another.” Unfortunately, rare earth minerals which represent a key component for thousands of global supply chains, particularly the production of semiconductors, are becoming harder and harder to acquire for U.S. manufacturers. We generally think of semiconductors in terms of their use in cars or mainstream electronic products but they also serve a vital purpose in support of the smooth operations of the many facets of the gaming industry. Can you describe potential actions the United States and our European partners should be taking to better diversify and secure access to this critical tier within global supply chains for so many current and emerging industries?

Answer 1:

As I stated in my testimony, rare earths are actually not that rare in the earth’s crust, the issue is one of finding economically viable concentrations. In addition to Mountain Pass in California, the Bear Lodge Property in Wyoming offers a lot of opportunity, as well as Bokan Mountain on Prince of Wales Island in Alaska. In addition, Lynas Rare Earths has the Mt. Weld mine and is developing a new mine and processing facility at Kalgoorlie, both in Western Australia as well as a processing plant in Texas. Lynas also operates a large processing plant in Malaysia. There is also ongoing research to develop processes for recovering certain rare earths like neodymium from electronics scrap. I recall a recent discussion I had at the Argonne National Labs where this topic came up.

I believe the U.S. should invest in basic R&D for new processing methods, such as bio/adsorption and other non-conventional technologies. We should also look at non-conventional sources like coal and coal byproducts, mine tailings, etc. These approaches of course will take time. In the meantime, we should be building a strategic stockpile, much as we have done for oil.

I think we should also look at our sourcing of other critically important metals. American companies depend on Russia for titanium and titanium forgings, and obviously metals like cobalt, nickel, niobium, and tantalum are strategically important.

Question 2:

As was mentioned in the hearing, the U.S. and the EU still lack a common diversification strategy and a shared approach to responding to a crisis, how can the EU and the U.S. cooperate to enhance their independence and ramp up domestic production through a joint research and development agenda?

Answer 2:

The U.S. and Europe have demonstrated an ability to cooperate in science-led areas, a recent example being the James Webb Space Telescope. The EU and the U.S. maintain an "Agreement for scientific and technological cooperation between the European Community and the Government of the United States" which is renewed regularly, and it's ENRCH in USA project demonstrates that European companies value participation in American ecosystems. I have presented to numerous groups visiting from European countries who recognize the power and value of American innovation, so I believe there are more opportunities for longer term win-win collaborations.

The timing is good for Trans-Atlantic cooperation in areas related to decarbonization and the energy transition. Because China has the most modern grid since it has enjoyed so much investment and modernization over the last three decades, I think the U.S. would gain a lot from working with the EU, where considerable investments have been made in recent years in things like grid re-engineering. China is a leader in things like long-distance high voltage DC transmission, and as I alluded to in the hearing, is also likely way ahead of both the U.S. and the EU in understanding the analysis of power systems when it comes to stability arising from the increased use of solid state power electronic converters instead of the control of rotating mass type generation equipment (turbines). Cybersecurity and grid security is likely a key area both regions would benefit enormously from close cooperation, especially in view of where attacks tend to come from.

Increased cooperation in the life sciences would also benefit both the EU and the U.S. Both would enjoy more resilience if together we could secure the regional supply of more fine chemicals and in particular key precursor reagents. We could also work together more on things like process intensification, specially directed at production of biopharmaceuticals.

American and EU researchers in a wide range of fields have a long history of cooperation. This is a good time to encourage more and build a broader base that ultimately will lead to more regionalized production capabilities.

ADDITIONAL INFORMATION SUBMITTED FOR THE RECORD
DR. SCISSORS

Addition to the Record for

“Transatlantic Cooperation on Critical Supply Chain Security”

January 19, 2022

House Foreign Affairs Committee

Subcommittee on Europe, Energy, the Environment and Cyber

by

Derek Scissors, American Enterprise Institute

China has the same attitude toward supply chains as it had toward the international economic system in the first place: if you can't beat 'em, join 'em. Then beat 'em. China will compete or subsidize its way into a supply chain, then often attempt to manipulate it for economic, political, or (conceivably) military advantage. For the US to genuinely protect against this risk will be costly. But the costs will be lower and the gains higher if the US works with its closest allies and partners, the most important of which is Europe. To succeed here, the US must establish greater credibility through more robust policies on export controls and outbound investment.

Facing China's challenge

Possibly the most important fact regarding strengthening American supply chains, in transatlantic or other contexts, is that half-measures against predatory Chinese behavior will not work. China is economically competitive. But when it is not, it has the world's most extensive subsidies scheme available to distort any chain the PRC considers to be a national priority.¹ No genuinely commercial business, American or European, can compete with that range of subsidies. Further, tax incentives and other support for these businesses can simply be overwhelmed – Beijing is better at subsidizing than anyone else.

If it is found to be necessary to cut the PRC out of a supply chain, production in China and by Chinese enterprises overseas must be outright banned by law, or they will find a way to continue to participate.

It may seem that the supply chain challenge is not primary about China, but about the pandemic. This is misleading. First, Beijing's mendacity regarding the pandemic and its "zero-Covid" policy have contributed to disruptions during the pandemic. Further, risky dependence on the PRC for important goods pre-dates and will post-date Covid, given Beijing's intent to make the world more dependent on China.² Pre-pandemic, Congress was rightly concerned about the dominance of Chinese chemicals in global manufacturing of active pharmaceutical ingredients (API), for instance.³ The PRC's attempt to dominate rare earths supply has long been a concern and is being joined by a rush of Chinese investment in cobalt and lithium,⁴ both of which may be growing in importance to American and European industry.

The initial Covid outbreak showed even friendly countries will compete over supply in a crisis. This is important to factor into American preparation – the US needs to be as self-reliant as possible for some months and also consider whether we should develop excess capacity to assist our friends. But even if supply chains permanently escape Covid disruption this year, China would have the ability to interrupt shipments of important goods and the intention to acquire control of more chains, as the world economy and Beijing's priorities evolve.

There are compelling reasons – from reliable behavior in a crisis to human rights repression – for the US to ban the PRC from key supply chains. Yet this has not happened.⁵ The primary reason, of course, is it will be costly.

¹ The most important Chinese subsidy is competition control - neither foreign nor private Chinese firms are allowed to compete with state-owned enterprises in a variety of sectors, guaranteeing high revenue and profit. See Huanxin Zhao, "China Names Key Industries for Absolute State Control," *China Daily*, December 19, 2006, https://www.chinadaily.com.cn/china/2006-12/19/content_762056.htm. For a telling example of a financial subsidy, see *Bloomberg Businessweek*, "Huawei's \$30 Billion China Credit Opens Doors in Brazil, Mexico," April 24, 2011, <https://www.bloomberg.com/news/articles/2011-04-25/huawei-counts-on-30-billion-china-credit-to-open-doors-in-brazil-mexico?sr=1&sp=2>. For a subsidies overview, see Usha C.V. Haley and George T. Haley, "How Chinese Subsidies Changed the World," *Harvard Business Review*, April 25, 2013, <https://hbr.org/2013/04/how-chinese-subsidies-changed>.

² Steven Lee Myers and Keith Bradsher, "China Says It Remains Open to the World, but Wants to Dictate Terms," *The New York Times*, November 23, 2020, <https://www.nytimes.com/2020/11/23/world/asia/china-xi-jinping-globalization.html>.

³ Senate Democrats, "Leader Schumer Calls on Gao to Investigate U.S. Reliance on Chinese Pharmaceutical Import, Says Dependence Poses National Security Risk," press release, December 12, 2019, <https://www.democrats.senate.gov/newsroom/press-releases/leader-schumer-calls-on-gao-to-investigate-us-reliance-on-chinese-pharmaceutical-imports-says-dependence-poses-national-security-risk>.

⁴ Felix Todd, "China, Cobalt and the Congo: Why Xi Jinping Is Winning the 'Batteries Arms Race,'" *NS Energy*, August 13, 2019, <https://www.nsenerybusiness.com/features/china-cobalt-congo-batteries/>; and Yukun Liu, "Lithium Companies Boost Investment Globally," *China Daily*, November 30, 2021, <https://www.chinadaily.com.cn/a/202111/30/WS61a57716a310cdd39bc78412.html>.

⁵ The Trump administration never got beyond the comment stage in policy formulation, see Businesswire, "Vizient Offers Comments to FDA on List of Essential Medicines, Medical Countermeasures and Critical Inputs," December 4, 2020, <https://www.businesswire.com/news/home/20201204005575/en/Vizient-Offers-Comments-to-FDA-on-List-of-Essential-Medicines->

To now, global chains have been created primarily to reduce cost, and altering them almost always will have a price tag attached. This prospect is unappealing for countries that do not view China as a major economic or security threat. One way to reduce costs is to formulate clear and enduring policies, emphasizing certainty in the climate companies face.

In addition, there has been a debate in the US, and to a lesser extent the EU (the only two economic entities large enough to have the debate), about re-shoring versus near-shoring, say to North America.⁶ A variant on near-shoring does not concern geography but rather “near shores” in terms of economic practices, security concerns, and political systems.

It would reduce the cost of excluding the PRC from some supply chains for the US and others if we work to fully include our treaty allies and free trade agreement partners, such as NATO members, Japan, and Israel. This would naturally be predicated on cooperation by these countries with respect to Chinese supply chain participation. Beijing would like nothing better than America’s relationships with our friends to deteriorate – the US should push in the other direction.

Europe in particular

The EU plus the UK is the most important of America’s economic partners, due to size but also technological capability. Adding to that, NATO is the most important security organization in the world. Even with the NATO alliance, though, it is almost impossible for European countries to see the PRC as the national security threat the US does. Europe does not have to consider servicemen and women dying to protect Taiwan. This makes transatlantic cooperation harder, since the two sides face different levels of risk in dependence on Chinese supply. Further, America and Europe will not identify the same supply chains as critical.

Still, if the US does not work to include Europe in a supply chain revamp, countries are more likely to ignore American demands to limit technology sharing with the PRC. Alternately, the EU could try to establish its own self-contained supply chains, (mistakenly) cutting the US out. If the US offers to treat Europe as a close supply chain partner, it will encourage cooperation. While costly, relocating production out of China will also bring benefits elsewhere as the activities begin to shift to new countries. One promising area is solar energy, where neither the US or Europe can be comfortable relying on Chinese supply, while the PRC’s track record has been to subsidize all competitors out of business.⁷

Semiconductors are a common illustration of the importance of transatlantic cooperation. Supply chains are not limited to actual producers, the companies that provide equipment to those producers are also part of the chain. This is why the US has pressured Dutch photolithographic systems-maker ASML not to sell advanced machines to the PRC, since it will improve the quality of Chinese semiconductors.⁸ Elsewhere in Europe, Norway’s Elkem makes industry-grade silicon. Britain’s Arm is a competitive chip-maker with a twist: it has been forced

⁶ <https://www.whitehouse.gov/wp-content/uploads/2021/06/100-day-supply-chain-review-report.pdf>.
⁷ <https://www.csis.org/analysis/manufacturers-dilemma-reshoring-and-resiliency-pandemic-world>.
⁸ <https://www.usnews.com/news/technology/articles/2022-01-19/asml-still-has-no-licence-to-ship-newest-machines-to-china-ccc>.

⁶ <https://www.whitehouse.gov/wp-content/uploads/2021/06/100-day-supply-chain-review-report.pdf>.
⁷ Cristina Brooks, “EU Seeks Share of China-Centric Solar, Wind Supply Chains,” IHS Markit, May 28, 2021, <https://cleanenergynews.ihsmarkit.com/research-analysis/eu-seeks-share-of-chinacentric-solar-and-wind-supply-chains.html>; and *Bloomberg Businessweek*, “China Has a 42 Billion Clean Energy Debt, And It Is Getting Worse,” BloombergQuint, last updated on July 19, 2020, <https://www.bloombergquint.com/technology/china-has-a-42-billion-clean-energy-debt-and-it-is-getting-worse>.
⁸ Reuters, “ASML Still Has No License to Ship Newest Machines to China - CEO,” U.S. News and World Report, January 19, 2022, <https://www.usnews.com/news/technology/articles/2022-01-19/asml-still-has-no-licence-to-ship-newest-machines-to-china-ccc>.

to confront a rogue Chinese subsidiary, in a business environment where upgrading strategic sectors like semiconductors is a national priority and respecting foreign intellectual property is certainly not.⁹

If these and other European companies involved in chip supply chains are willing to follow rules excluding Chinese participation, they should be allowed to participate fully in chains serving the US. The same should be true for American companies meeting demand in Europe. Crafting these rules and binding market access commitments would be an excellent job for the US-EU Trade and Technology Council (TTC), so that it does not fall into the trap of becoming just a talk shop.

American or European insistence on self-reliance in semiconductors would reduce the incentive for the other to cooperate with regard to the PRC. To help avoid this, the US must bring to the table at the TTC and with other partners the willingness to take costly actions in the China relationship, actions which have been largely absent to date.

Overdue US policies

To now, American supply chain policy-making can only be described as a failure. Not only has the US done little to make chains more resilient, it has actually made China more competitive. This makes it more difficult for supply chains outside the PRC to thrive and reduces American credibility. The US continues to sell China technology useful to key supply chains and has drastically increased investment in PRC enterprises, some of which participate in these chains.

In 2018, Congress voted on an overwhelming bipartisan basis (400-2 in the House) to reform export controls, featuring controls for “foundational technology,”¹⁰ such as a fair amount of medical equipment. In three and half years and counting, the Department of Commerce’s Bureau of Industry and Security (BIS) has not taken a single action to control foundational technologies, putting its view of potential lost sales ahead of the law.

This has the dubious benefit of making harmonizing with Europe easy, since the US has done nothing to require harmonization. What the US has done is continue to provide easy access to technology that will help China outcompete American medical and other companies. Repeated controls applied to foundational technologies in 2022 would at least show BIS intends to start doing what they’ve been required to.

The investment situation may actually be worse, though it’s impossible to know for sure. At the end of 2016, total American investment in Chinese stocks and bonds was \$368 billion.¹¹ At the end of 2020, it was \$1.15 trillion. The \$780 billion in new financing for Chinese companies over this period is roughly the same as what we are spending on defense in fiscal 2022.¹² The Department of the Treasury declines to publish information on what activities this money might support, as if American investors know nothing about their Chinese counterparties. But all the firms ultimately receiving funds are more competitive than they otherwise would be. The US is thus helping the PRC expand its role in global supply chains, and is not even aware of how much or which chains.

⁹ Joel Hruska, “ARM China Seizes IP, Relaunches as an ‘Independent’ Company [Updated],” Extreme Tech, August 30, 2021, <https://www.extremetech.com/computing/326447-arm-china-seizes-ip-relaunches-as-an-independent-company>; and Joe McDonald, “China’s Leaders Say Tech Growth Top Priority amid US Tension,” AP News, December 18, 2020, <https://apnews.com/article/technology-beijing-xi-jinping-china-economic-growth-75ee97bdb9f5ddf87587e6a2916c7cf>.

¹⁰ US Congress, “All Information (Except Text) for H.R. 5841 - Foreign Investment Risk Review Modernization Act of 2018,” <https://www.congress.gov/bills/115/h-congress/house-bill/5841/all-info>.

¹¹ US Department of Treasury, “Securities (C): Annual Cross-U.S. Border Portfolio Holdings,” <https://home.treasury.gov/data/treasury-international-capital-tic-system-home-page/tic-forms-instructions/securities-c-annual-cross-us-border-portfolio-holdings>.

¹² Senate Armed Services Committee, “Summary of the Fiscal Year 2022 National Defense Authorization Act,” <https://www.armed-services.senate.gov/imo/media/doc/FY22%20NDAA%20Agreement%20Summary.pdf>.

The solution is not sweeping bans on sales or investment. Rather, Congress should as soon as possible set priorities with regard to what supply chains matter most -- where we should stop boosting Chinese competitiveness and instead facilitate chains that will serve the US without Chinese participation. An illustration is the National Critical Capabilities Defense Act, introduced in the House in December 2021 on a bipartisan basis.¹³ The current version of the bill may cite too many "critical" industries but it is a welcome and much-needed step after many months of empty talk. Through this legislation or something similar, Congress should take steps to quickly shift what are identified as the most important supply chains.

Some possibilities are more advanced semiconductors (including their packaging), API, and crisis medical supplies such as masks and vaccine components.¹⁴

Another area to consider is raw materials which are not broadly mined at present, such as cobalt and some rare earth elements. When production is concentrated,¹⁵ these materials can be vulnerable to market manipulation which could affect a number of supply chains. Beijing has not yet been successful in manipulating rare earth markets for a sustained period but is still working toward that end, most recently merging the rare earth businesses of two very large state-owned enterprises.¹⁶ A bill introduced in the Senate this month bans the use of Chinese rare earths in defense purchases.¹⁷ If the US were serious about secure supply chains, the PRC would not be allowed to participate in *any* defense chains.

Unless we lead, America cannot expect costly cooperation from a Europe that does not face a high-level security threat from China. After Congress sets its priorities, it should push the executive to bring those priorities into the TTC. Cooperation with Europe on China is one area where deep American divisions on trade can be overcome. Nearly two years after the pandemic began to threaten supply chains, the executive branch has been unable to do more than talk. There is urgent need for strong Congressional action.

Recommendations

The US should:

- 1) Immediately identify the most important supply chains, such as involving API.
- 2) For these chains, quickly begin the process of a phased elimination of all Chinese participation, using mandates rather than incentives the PRC would overcome.
- 3) Invite treaty allies and free trade partners, at least, to participate in supply chains serving the US, to lower the cost of transition and encourage their cooperation.

¹³ Brian Fitzpatrick, "Fitzpatrick, DeLauro, Spartz, Pascrell Introduce the National Critical Capabilities Defense Act," press release, <https://fitzpatrick.house.gov/press-releases?id=098D421E-574C-429E-B742-47F62FF634FD>.

¹⁴ Gary Gereffi, "What Does the COVID-19 Pandemic Teach Us about Global Value Chains? The Case of Medical Supplies," National Center for Biotechnology Information, June 23, 2020, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7360894/>; and Caroline Barnhill, "The COVID-19 Vaccine Supply Chain: Potential Problems and Bottlenecks," NC State University Poole Thought Leadership, January 5, 2021, <https://poole.ncsu.edu/thought-leadership/article/the-covid-19-vaccine-supply-chain-potential-problems-and-bottlenecks/>.

¹⁵ Nicholas LePan, "Rare Earth Elements: Where in the World Are They?" Visual Capitalist, November 23, 2021, <https://www.visualcapitalist.com/rare-earth-elements-where-in-the-world-are-they/>; and NS Energy, "Profiling the World's Eight Largest Cobalt-Producing Countries," February 22, 2021, <https://www.nsenerybusiness.com/features/top-cobalt-producing-countries/>.

¹⁶ Jeremy Hsu, "Don't Panic about Rare Earth Elements," *Scientific American*, May 31, 2019, <https://www.scientificamerican.com/article/dont-panic-about-rare-earth-elements/>; and Zhihua Liu, "State-Owned Enterprise Seen Changing Rare Earth Market," *China Daily*, December 24, 2021, <https://global.chinadaily.com.cn/a/202112/24/WS61c52097a310cdd39bc7d382.html>.

¹⁷ Tom Cotton, "Cotton, Kelly Introduce Bill to End Reliance on China for Rare-Earth Elements," press release, January 14, 2022, <https://www.cotton.senate.gov/news/press-releases/cotton-kelly-introduce-bill-to-end-reliance-on-china-for-rare-earth-elements>.

- 4) Fully implement export control reform passed by Congress in 2018.
- 5) Identify Chinese industries being supported by American investment and incorporate that information into efforts to curb PRC participation in vital chains.
- 6) Introduce these initiatives to the TTC, seeking Europe's cooperation in stages -- very quick for the least controversial steps with ongoing work to narrow gaps elsewhere.